BUREAU OF HYGIENE AND TROPICAL DISEASES.

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HELMINTHIASIS.

FAUST (Ernest Carroll). **Parasitic Infections and Human Disease in China.**—*Arch. Path. & Lab. Med.* Chicago. 1926. Aug. Vol. 2. No. 2. pp. 223–240. With 1 map in text. [50 refs.]

Faust divides the Sino-Japanese area into five regions, each with its own dominant infections, as follows: (1) *Tropical oriental* (French Indo-China, south China littoral to Fukien with Hainan and Formosa) where the dominant infections are malaria, amoebiasis together with Clonorchis, Fasciolopsis, Hookworm, Ascaris, Whipworm and Filaria. (2) *Subtropical oriental* (Central and lower Yangtze littoral to Kiangsu and southern Korea and southern Japan) where are found *S. japonicum*, and Paragonimus together with amoebiasis, Hookworm, Ascaris and Trichocephalus. Malaria is also extensive. (3) *Intermediate* region between the oriental and palearctic with no dominant infections. (4) *Palearctic* (the cold semi-dry regions of northern China, Manchuria, Korea and Japan). In China kala azar is dominant, in Japan, *Dibothriocephalus latus*. Malaria is endemic. (5) *Dry Palearctic* (the arid uplands of north western China and Mongolia). No infections are dominant, but occasional cases of kala azar, Ascaris and hydatid are found.

Intermediate and reservoir hosts are very important in the Far East—there are at least eight species of flukes in China, all requiring intermediate hosts and of these in only one, *Schistosoma japonicum*, is man the only important definitive host involved. In Fasciolopsis and Clonorchis, the pig, dog and cat are very important reservoirs. The economic use of night soil together with promiscuous defaecation and uncleanly habits perpetuate these infections. Raw food products are extensively used, and it is only because the habits of people and climate vary in different parts that the infections are not all wide-spread.

The more important parasitic infections are briefly described. Schistosoma is found mainly in the Yangtze valley (where the intermediate host is *Onchomelania hupensis*) and on the coastal streams (where *Katayama nosophora* is implicated). Clonorchis is carried by *Bithynia striatula* and is only heavy near Kwang-tung. Paragonimus is most common in Korea and Formosa. *Opisthorchis felineus* is of clinical importance in Russia and Siberia. Metorchis is found only in cats and several species of Heterophyid flukes are common in cats and dogs and occur occasionally in man (Metagonimus, Heterophyes and

(K3231) Wt P5/240 1,625 6/27 H & Sp Gp 52

Stamnosoma). Fasciolopsis occurs in south and central China and Formosa. In central China the dog is an important reservoir host. Human infection is heavy in Shaohsing, Canton and Siulam. Other flukes include Fasciola and Dicrocoelium in ruminants, Eurytrema in pigs and ruminants, and Watsonius occasionally in monkeys.

Hookworm is extensive in south China. Filariasis is incompletely known. The commonest human parasite is Ascaris, while Whipworm is only less so. Gnathostoma occasionally causes a creeping disease. *Taenia solium* is endemic in central and north China, while *T. saginata* is common in the north. Hydatid is found in Mongolia. *Sparganum mansoni* is common throughout the area in the subcutaneous tissue of frogs and snakes; its adult form, which is resident in the intestine of the dog, cat and man, is more common in man in China than the larva. *D. latus* is found in Siberia and northern Japan. It is not endemic in China. *Dipylidium caninum* and *H. nana* also are found in human beings. Many of the important references to which Faust refers in this very valuable survey have been previously abstracted in this *Bulletin.* [See also summary *ante*, p. 385]

T. W. M. Cameron.

Veneroni (Carlo). Note di elmintologia medica nella Somalia Italiana. [**Medical Helminthology in Italian Somaliland.**]—*Arch. Ital. Sci. Med. Colon.* Tripoli. 1927. Jan. Vol. 8. No. 1. pp. 26–28.

Veneroni gives an annotated list of the helminths occurring in Italian Somalia. The commonest cestodes are *H. nana* and *T. saginata*, the latter being especially common. Among the roundworms, Ascaris is common while Ancylostoma and Necator are found in 34 per cent. of the natives. Trichocephalus is also frequent, while several cases of *F. bancrofti* have been observed by the author. *S. haematobium* is found in about 30 per cent. of the population and is a serious infection. The only snail capable of acting as intermediate host is a species of *Ampullaria*. *Schistosoma mansoni* is absent.

T. W. M. C.

da Silva (F. Venancio). Note sommaire sur l'infestation de l'intestin des indigènes d'Angola. [**Intestinal Infestations of the Natives of Angola.**]—*Revista Méd. de Angola.* (No. especial 1e. Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a. 7a e 8a Sessões.) 1923. Aug. No. 4. pp. 381–388.

The Angola natives have an infection with hookworms (Ancylostoma and Necator) amounting to between 70 and 93 per cent. and often in consequence show a certain amount of anaemia and weakness, although in many cases no symptoms are present. The author recommends a campaign for the eradication of the disease with compulsory anthelmintic treatment. Ascaris, Whipworm and Strongyloides are also common.

R. T. Leiper.

Davies (D. S.). **The Detection and Treatment of Bilharziasis and Ankylostomiasis in Dongola Province, Anglo-Egyptian Sudan.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. 9. Vol. 20. No. 7. pp. 436–446.

Dongola is a small unimportant province with a very important source of intelligent labour. Bilharziasis was found in 1921 to be endemic in

Nuri and treatment with tartar emetic was commenced. The author finds that only those urines showing albumen need examination for ova of schistosomes; later he satisfied himself that albumen practically did not exist without the worm. Natives were also examined for hookworms by dosing with carbon tetrachloride, the stool being afterwards searched for adult worms. Nearly 5,000 cases (over 30 per cent. of the total population) were investigated; 9·7 per cent. were found to be infected with schistosomes and 11·2 per cent. with ankylostomes. In various selected centres the inhabitants were treated intensively for these conditions, and by this means it is hoped to eradicate the diseases in a few years.

R. T. L.

Rodriques (J. S. N. Humberto). Contribuição para o estudo do indice parasitologico intestinal na India Portugueza. [**Intestinal Parasitic Index in Portuguese India.**]—*Arquivos Indo-Portugueses de Med. e Historia Nat.* Nova-Gôa. 1926. Vol. 3. pp. 296–325. [3 refs.] [French summary p. 325.]

Rodriques has examined the faeces of natives at Gôa and finds that both Ancylostoma and Necator are present and are fairly common (about 20 per cent. of each in 250 patients examined). Other parasites are Ascaris (75 per cent.), Trichocephalus (55 per cent.) Oxyuris, and Strongyloides.

T. W. M. C.

Plavtov (K. A.). **The Results of Helminthologic Examination of Children's Homes by the American Committee in Armenia.**—*Rev. Microbiol. et Epidémiol.* 1926. Vol. 5. No. 4. English summary p. 336. [In Russian pp. 295–298.]

The American committee at Leninakan (late Alexandropol) in 1922–25 examined 1,311 children for the presence of parasites and found Whipworm (563), Ascaris (558), *T. saginata* (136), *H. nana* (25), *Trichostrongylus instabilis* (14), Oxyuris (12), Strongyloides (1), Fasciola (1) and Hydatid (1).

T. W. M. C.

Makhviladze (N.) & Didebuladze. [**On the Endemic Foci of Ankylostomiasis in Georgia.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 1. pp. 23–28. With 4 text figs. [In Russian.]

The authors have conducted systematic examinations of the faeces of patients attending the Tiflis University Clinic from 1922 till 1924, the total number examined being 630. The following worms were found to be prevalent: *Trichuris trichiura* (72·5 per cent.), *Ascaris lumbricoides* (55·88 per cent.), *Taenia saginata* (2·22 per cent.), *T. solium* (3·23 per cent.), *Hymenolepis nana* (0·49 per cent.), *Enterobius vermicularis* (1·47 per cent.). Ankylostomiasis (both Ancylostoma and Necator being represented) occurs chiefly in Western Georgia, where 50 per cent. of the cases examined were infected, whereas from Eastern Georgia there are no cases on record. The difference is attributed to climatic conditions.

C. A. Hoare.

LEIPER (R. T.). **Discussion of the Validity of Certain Generic Names at present in Use in Medical Helminthology.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Sept. 13. Vol. 30. No. 9. pp. 484–491.

From an examination of the original literature dealing with the nomenclature of some of the commoner helminths of man, Professor Leiper concludes that many of the names recently introduced into common use do not comply with the strict interpretation of the Law of Priority. This states that the valid name of a genus or species can be only the name under which it was first designated on the condition : (*a*) that this name was published and accompanied by an indication or a definition or a description, and (*b*) that the author has applied the principles of binary nomenclature.

Trichuris was proposed by ROEDERER in 1761 as a specific, not a generic name, and ROEDERER did not apply the principles of binary nomenclature. Accordingly the name of *Trichocephalus* is the correct one.

Similarly *Dioctophyme* was used by its originator, COLLET-MEYRET, in a colloquial sense, and the correct name of the only species is *Eustrongylus visceralis*.

Similarly the correct names of the common Round worm and the Seat worm of man are *Stomachida lumbricoides* and *Ascaris vermicularis*.

" *Lumbricus canis*," the type of STILES' genus *Toxocara* in 1905, does not exist, WERNER having used the expression *Lumbrici canis* as a heading to his description and *Lumbricus ex cane* in the Latin text. This name is accordingly replaced by *Belascaris* Leiper 1908.

Dracunculus also was not used validly until COBBOLD used it in 1864, by which time it had been preoccupied. Leiper accordingly renames the Guinea worm *Fuellebornius*.

The article is a severe criticism of the loose way in which some workers have interpreted the second condition of the Law of Priority, and many examples of this are quoted. In the days when Latin was the common scientific tongue, writers describing colloquially a species had often of necessity to use an apparently binominal expression although they had no intention of adhering to the Linnean system. Other colloquialisms have also been pressed into formal nomenclature with the most unfortunate results. Professor Leiper's intention is not so much to insist on these changes necessitated by a strict interpretation of the Law, but to draw attention to the intolerable situation in nomenclature which has arisen owing to its interpretation in the past and may arise owing to its too strict application in the future.

T. W. M. C.

CAMERON (Thomas W. M.). **The Helminth Parasites of Animals and Human Disease.**—*Proc. Roy. Soc. Med.* 1927. Mar. Vol. 20. No. 5. pp. 547–556 (Sect. Comp. Med. pp. 15–24).

This is essentially an annotated list of the helminths of man and their animal hosts. The author discusses the epidemiology of hydatid disease, cysticercosis, Dibothriocephalus and Trichinella. The importance of reservoir hosts and of biological strains is considered. It is pointed out that most of the helminths of man are apparently of herbivorous origin originally, only a few—notably tapeworms and Ancylostoma—being of carnivorous origin. It is suggested that the distribution of the two genera of hookworms supports the theory of a dual origin of man (as

had been previously suggested by DARLING). The article concludes with a list of helminths of man, together with the animals in which they may be found.

R. T. L.

LYSSENKO (B.). Capillairoscopie chez les enfants malades d'helmintiasis. [**Capillaroscopy in Children infested with Helminths.**]—*Jl. Méd. de l'Asie Centrale.* Tashkent. 1926. Vol. 5. No. 8. French summary p. 527. [In Russian pp. 469–476. With 6 figs. on 1 plate.]

Lyssenko has examined 24 children, between the ages of 7 and 14, who were suffering from helminthic infections (mainly Hymenolepis, but including also, in some cases, Taenia, Ascaris, Oxyuris and Whipworm; in two cases, Fasciola, and in one, Fasciola and Dicrocoelium). He considers that helminths play a considerable part in determining vaso-nervous changes; but the existence of such a change as an independent unity requires confirmation.

R. T. L.

KUDICKE (Robert) & BORCHARDT (Werner). Der Einfluss von Galle und Pankreassaft auf die Wirksamkeit wurmtötender Arzneistoffe. [**Influence of Bile and Pancreatic Juice on the Activity of Vermicidal Drugs.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Sept. 13. Vol. 30. No. 9. pp. 467–475. [10 refs.]

These authors have examined the action of bile and pancreatic juice on various anthelmintics—more especially the halogen compounds of various hydrocarbons. They find that bile is a better solvent of these drugs than pancreatic juice or water, but from *in vitro* experiments on larvae they conclude that the unfavourable action of the bile will be neutralized to some extent by the pancreatic juice. An excess of bile not only reduces the action of the drug on the worms, but assists in the absorption of the drug by the body. They consider that research must be made into methods of stimulating the action of the pancreas during anthelmintic treatment and reducing the secretion of bile during this period.

T. W. M. C.

CHEN (K. K.) & HSIANG-CHUAN HOU. **The Alleged Anthelmintic Property of *Quisqualis indica* (Shih Chun Tze), with Case Reports.**—*Amer. Jl. Med. Sci.* 1926. July. Vol. 172. No. 1. (No. 652). pp. 113–116. With 1 fig. [3 refs.]

Quisqualis indica has been considered to be a powerful anthelminthic, and DAVENPORT in 1918 reported its successful use in ascariasis but not for other intestinal parasites. Chen and Hou have tested both the gum and the whole seed (raw and baked) and find that it has no anthelmintic action whatever for ascaris in man or dogs.

T. W. M. C.

CALLANAN (J. C. J.). **Preliminary Note on the Value of Three Examinations of Faecal Specimens in the Diagnosis of Entozoal Infections.**—*Kenya Med. Jl.* 1927. Vol. 3. No. 10. pp. 290–292.

Faeces were examined by emulsifying in normal saline and centrifuging; and the author considers that it is necessary to examine patients on at least three occasions in order to demonstrate all the varieties of ova found.

T. W. M. C.

Faust (Ernest Carroll) & Nishigori (Masao). **The Life Cycles of Two New Species of Heterophyidae, Parasitic in Mammals and Birds.**—*Jl. Parasit.* 1926. Dec. Vol. 13. No. 2. pp. 91–128. With 4 text figs. & 28 figs. on 3 plates. [47 refs.]

Faust and Nishigori describe two species of heterophyid flukes which they have succeeded in transmitting to man and various mammals and birds. These flukes—*Monorchotrema taihokui* and *M. taichui*—are characterized by the possession of a single testis and do not appear to exert any considerable pathogenic action on the host. Both species have snails of the genus *Melania* as their first intermediate host and various fresh-water fish as the second. In the snail, the stages are sporocyst and rediae. The lophocercous cercaria has a muscular tail with fluted keeled margins, and possesses eye-spots. The metacercariae are usually found in the fins, but also in the head, palate, and gill-arches—only seldom in the scales or muscles. The adult flukes live in the upper part of the small intestine when young, in the middle and lower parts when mature. The eggs closely resemble those of Clonorchis but have a less conspicuous "shoulder." Confusion, however, is very easy.

The authors believe that it is probable that the life history of these two species is characteristic of the heterophyid flukes in general and that adults of the same species may alike be found in mammals and birds.

They accept the validity of the genus *Stamnosoma* (this *Bulletin*, Vol. 20. p. 208), and consider that *Centrocestus cuspidatus* var *caninus* Leiper is a specimen of *S. formosanum*. In a footnote they point out that the correct name of *Metagonimus* is *M. yokogawai* (Katsurada, 1921), the name of *Heterophyes yokogawai* antedating *Loxotrema ovatum* by five months.

T. W. M. C.

Cilento (R. W.) & Backhouse (T. C.). **Paragonimiasis: its First Recorded Occurrence in the Territory of New Guinea.**—*Med. Jl. Australia.* 1927. Jan. 15. 14th Year. Vol. 1. No. 3. pp. 79–81. With 3 text figs. [3 refs.]

Cilento and Backhouse report the presence of Paragonimus from a native of New Guinea discovered during a routine examination: and as the man came from a village where practically no intercourse has taken place with Europeans or Asiatics, they conclude that an endemic focus exists. The natives use crabs as a staple of diet.

T. W. M. C.

Vasilieva (A. P.). [**Distomiases of the Liver in Children observed in Turkestan (Fascioliasis and Dicrocoeliasis).**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 1. pp. 36–43. [In Russian.]

Distomiases due to *Fasciola hepatica* and *Dicrocoelium lanceatum* were found in Turkestan in seven and two cases respectively out of 204 children examined. The disease had a chronic course, the chief symptoms being pain in the hepatic region, sickness and vomiting, dizziness and increased nervous excitability. Clinically, a diffuse hypertrophy of the liver was noted, while the following blood changes were observed: slight lymphocytosis, eosinophilia (25 per cent.) and

monocytosis (12 per cent.). Leucoblasts, promyelocytes and Turk's cells were present in small numbers in each blood film examined. For the detection of trematode eggs the duodenal juice was collected and centrifuged. Treatment was successfully conducted with emetine hydrochloride administered intravenously (3–4 cc. of one per cent. solution) fifteen injections usually resulting in a complete cure.

C. A. Hoare.

Flury (Ferdinand) & Léeb (Franz). Zur Chemie und Toxikologie der Distomen (Leberegel). [**Chemistry and Toxicology of Liver Flukes.**] —*Klin. Woch.* 1926. Oct. 29. Vol. 5. No. 44. pp. 2054–2055.

From a study of the liver-flukes, *Fasciola hepatica* and *Dicrocoelium lanceatum*, Flury and Léeb conclude that the parasites contain no single specific toxin. The disease consists in a poisoning caused by a series of various injurious substances, formed in part by decomposed tissue and in part by the physiological activities of the parasites themselves.

T. W. M. C.

Guillon (A.). Note sur le traitement des distomatoses par l'extrait éthéré de fougère mâle. [**Treatment of Liver Fluke Disease by Male Fern.**]—*Ann. de Med. et de Pharm. Colon.* 1926. Oct.–Nov.–Dec. Vol. 24. No. 4. pp. 593–595. [1 ref.]

The author recommends the trial of male fern in human liver fluke disease on account of the success of this treatment in corresponding conditions in animals.

Onorato (Raffaele). Un caso di distomatosi epatica ed erratica, da *Fasciola hepatica*, in Tripolitania. [**Case of *Fasciola hepatica* Infection in Tripolitania.**]—*Arch. Ital. Sci. Med. Colon.* Tripoli. 1924. Oct.–Nov.–Dec. Vol. 5. No. 10–11–12. pp. 129–142. With 3 text figs. [4 refs.]

Onorato records a case of Fasciola infection in a native of Tripolitania, two specimens being found in an appendicular abscess.

Nagano (Kanji). **The Geographical Distribution of the First Intermediate Host, "Bythinia striatula var. Japonica," in Okayama Prefecture.**— *Okayama-Igakkai-Zasshi* (*Zent. d. Okayama Med. Gesellsch.*). 1927. Jan. No. 444. English summary pp. 131–132. [In Japanese pp. 124–131. With 1 map. 5 refs.]

The molluscs are found in the south-western part of the prefecture. The area, severely infested with *C. sinensis*, is near Kojima Bay, and is low-lying clayey soil with much stagnant water. The incidence decreases as the distance from this spot increases. A map showing the distribution is given.

Odaka (Yoshio), Murata (Shiro) & Nagao (Syuzo). [**Distribution of Parasites in Ukishima Village and the Suburb of Numazu City in Shidzuoka Prefecture.**]—*Iji Shimbun* (*Med. News*). 1926. Aug. No. 1193. [Summarized in *Japan Med. World.* 1926. Dec. 15. Vol. 6. No. 12. p. 350.]

Pulmonary distomiasis and schistosomiasis Japonica are recorded.

Plavtov (K. A.). **Distomiasis among the Population of Nakhichevan.**—*Rev. Microbiol. et Epidémiol.* 1926. Vol. 5. No. 4. English summary p. 335. [In Russian pp. 291–294. 5 refs.]

Plavtov has examined 307 persons and has found seven different species of helminths in 194 cases. Five of these were *Dicrocoelium lanceolatum.*

T. W. M. C.

Blacklock (D. B.). **The Prevention of Human Schistosomiasis in Sierra Leone: Progress Report on the Kaiyima Scheme.**—*Sierra Leone Ann. Med. & San. Rep. for the Year 1925.* pp. 68–72. With 9 figs. on 3 plates.

Endemic schistosomiasis, in addition to being a very serious disease, is a sign of inadequate education in hygienic principles. Accordingly an educative, hygienic experiment has been put into operation in the village of Kaiyima. This includes a pure water supply, efficient refuse and faecal disposal, provision of snail-free bathing and washing places, treatment of polluted water and control of the water supply. The results so far have been encouraging. Prior to 1924, 30 per cent. of the local intermediate host—*Physopsis* sp.—were infected; now the snail has apparently disappeared. Disposal of excreta is becoming satisfactory and it is proposed to extend the experiment to other villages.

R. T. L.

Leger (Marcel). Les bilharzioses en Afrique Occidentale Française. [**Schistosomiasis in French West Africa.**]—*Revista Méd. de Angola.* (No. especial le Congresso de Med. Trop. da Africa Ocidental. Vol. 3. 3a, 4a e 5a Sessões). 1923. Aug. No. 4. pp. 141–148.

Leger examined 159 cases of Schistosoma infection in French West Africa at Dakar during 1922–23. Nineteen of these were intestinal cases, 6 being caused by *S. haematobium,* while of the cases which were vesicular 140 were caused by this parasite and only one by *S. mansoni. Bullinus contortus* is found at Médina (Upper Senegal) as also is *B. strigosus; Planorbis boissyi* has not been reported from this neighbourhood although 16 other species of this genus occur.

T. W. M. C.

Durand (Paul). La bilharziose au Sahara-Djanet. [**Schistosomiasis at Djanet in the Sahara.**]—*Arch. Inst. Pasteur de Tunis.* 1926. Dec. Vol. 15. No. 4. pp. 348–361. With 1 map & 1 fig. in text. [13 refs.]

South of the Sahara, bilharziasis is widespread in the French colonies; on the Mediterranean littoral, however, it is much less serious. The state of affairs in the desert is less well known, and except for Djanet, Algeria is free from the disease. At this oasis, however, where a considerable circulation of population exists, *Schistosoma haematobium* is present and *Bullinus contortus* is plentiful [see this *Bulletin,* Vol. 23, p. 474.]

R. T. L.

Anderson (Ch.) & de Lagoanère (J. L.). A propos de la bilharziose en Tunisie. Nouveaux essais d'infestation de *Bullinus brocchii* avec des oeufs de *Schistosomum haematobium*. [**Attempts to infest *B. brocchii* with *S. haematobium*.**]—*Bull. Soc. Path. Exot.* 1927. Jan. 12. Vol. 20. No. 1. pp. 23–25. [4 refs.]

Using miracidia hatched from eggs of *Schistosoma haematobium* (found in the urine of a Senegalese), the authors have attempted to infect *Bullinus brocchii* var. Ehr. The snails died before the completion of the experiments but sporocysts were found in one snail out of twenty.

R. T. L.

Raynaud (Lucien). La bilharziose en Afrique du Nord. [**Bilharziasis in N. Africa.**]—*Bull. Office Internat. d'Hyg. Publique.* 1926. Dec. Vol. 18. No. 12. pp. 1409–1412. With 1 map. [12 refs.]

No cases of bilharziasis have been reported from Algeria except at the oasis of Djanet in the extreme South, although Bullinus has been recorded from the canals at Biskra. Several foci of *S. haematobium* exist in Tunis and various species of Bullinus occur there, including *B. contortus*, *B. brochii* and *B. dybowskii*. In Morocco there are also endemic foci and in Tangiers both *B. contortus* and *Planorbis dufourii* have been found.

T. W. M. C.

Veneroni (Carlo). La bilharziosi vescicale in Somalia. [**Vesical Schistosomiasis in Somalia.**]—*Riforma Med.* 1926. Jan. 4. Vol. 42. No. 1. pp. 9–10. With 1 map in text.

Although about 30 per cent. of the native population of Somalia suffer from *S. haematobium* infection, Veneroni has only been able to find a species of Ampullaria in this region, Bullinus being apparently absent. Examination of the urines of 100 cases of vesical schistosomiasis was negative for ova of *S. mansoni*, only *S. haematobium* being present.

T. W. M. C.

Advier. Note sur quelques cas de bilharziose observés en Cochinchine chez des soldats originaires des Antilles. [**Bilharziasis observed in Cochin China in Soldiers from the West Indies.**]—*Ann. de Méd. et de Pharm. Colon.* 1926. Oct.–Nov.–Dec. Vol. 24. No. 4. pp. 571–578.

Schistosoma infection does not exist in Indo-China, the only recorded cases being imported. The writer has examined 116 soldiers from abroad and found 32 infected with *S. mansoni* and one with *S. haematobium* (contracted in Algeria) and he considers that this large number of carriers in Cochinchina, with no indigenous cases, proves that the disease cannot exist there.

T. W. M. C.

Smith (Sydney) & O'Farrell (W. R.). **Subcapsular Rupture of the Spleen with Delayed Intraperitoneal Haemorrhage. "Bilharziasis."**—*Jl. Roy. Army Med. Corps.* 1926. Nov. Vol. 47. No. 5. pp. 373–376. With 3 text figs.

Smith and O'Farrell record a case of rupture of a spleen subsequent to a blow. The spleen was enlarged and congested and contained groups

of terminal spined schistosome eggs surrounded by eosinophile cells. The liver also contained ova, many of which were degenerated; the bladder also was severely infected. They consider that death was due to the traumatic rupture of a small vessel, the consequent haemorrhage rupturing the capsule.

R. T. L.

KOHN (Salo). **Some Bilharzia Cases.**—*S. African Med. Rec.* 1926. Sept. 25. Vol. 24. No. 18. pp. 407–408.

Kohn records eight cases of Bilharzia disease and points out that urine should be examined on several different occasions in doubtful cases, as ova are not always found—sometimes only a single degenerate ovum may be seen. The degenerate ova always contain blue pigment granules.

R. T. L.

CAWSTON (F. G.). **A Case of Bilharzia Disease with the Spindle-Shaped Ova.**—*Jl. Trop. Med. & Hyg.* 1927. Mar. 15. Vol. 30. No. 6. p. 81.

Cawston records the occurrence of spindle-shaped ova in the urine of a boy who had a *S. haematobium* infection.

T. W. M. C.

KHALIL (M.). **A Comparative Study of the Methods utilised in the Treatment of Bilharziasis with a Report on a New Remedy "Bayer SB. 212."**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Sept. 13. Vol. 30. No. 9. pp. 451–467. With 2 charts in text. [16 refs.]

Emetine is much inferior to tartar emetic as a curative drug for schistosomiasis, but its value lies in its antihaemorrhagic action, and as amoebic dysentery is a frequent complication to intestinal schistosomiasis in Egypt it is often given alternatively with tartar emetic. It is also indicated where the intravenous route is not practicable as in children and fat persons, since it can be administered intramuscularly. It is a powerful depressent however, and should not be given where there is intolerance, circulatory disturbances, or renal disease. Neuritis is a common sequel to its use.

Tartar emetic is best given in a 6 per cent. solution in distilled water. This is practically a saturated solution, and so provides a valuable safety provision, as too concentrated a solution cannot be used: 1 cc. of this solution contains 1 grain of the drug, and as the maximum dose is 2 grains, a small syringe and a fine needle may be used. By using a solution of this strength and assisted by three lay attendants—to fill and clean the syringe, to arrange the patients, and to hold their arms, a single physician may treat at least 150 persons per hour. In Egypt, doses are given three times weekly for about three weeks, ·5, 1, 1·5 cc. on the first three days and 2 cc. daily thereafter. Khalil has treated over 6,500 persons in this way with over 90 per cent. of cures.

Sodium antimony tartrate is as efficient as the potassium salt (tartar emetic) but is more expensive and less stable. The decomposed salt is toxic.

Bayer Sb. 212 is a new complex salt of an organic antimonyl acid. It is used in 2 per cent. solution (higher concentrations appear to be toxic), 1 cc. of which contains ·005 gm. antimony. Two severe cases have been treated by Khalil with this new drug, the injections,

which commenced at 2 cc. and reached 8 cc., being given intramuscularly. By its use much more antimony can be administered in a given time and it is excreted more slowly than tartar emetic. Its disadvantage is its bulk. In its present form it is useful for children and fat persons where intravenous injections are not advisable.

R. T. L.

Specht (Richard). Die Behandlung der Bilharziosis mit dem Präparat Heyden 661 (Antimosan). [**Treatment of Bilharziasis with Antimosan.**]—*Deut. Med. Woch.* 1926. Mar. 26. Vol. 52. No. 13. pp. 519–520. [12 refs.]

Two Egyptian students (who had been in Germany for several years and were supposed cases of chronic nephritis) were found to have *Schistosoma haematobium* eggs in the urine, and in one eggs were also present in the faeces. In both cases the disease was of about one year's standing. The patients were quickly cured with injections of Heyden 661 (Antimosan), which is said to have had none of the unpleasant after-effects of tartar emetic. A further study of the therapeutic value of antimosan in endemic areas, where material is more abundant, would be very valuable.

R. T. L.

Christopherson (J. B.); Khalil (M.). **Bilharzia Ova and the Test Tube.**—*Brit. Med. Jl.* 1927. Mar. 5. pp. 418–419. [10 refs.]; Apr. 9. pp. 702–703.

Christopherson contests the statements of Khalil and of Dye that tartar emetic does not destroy bilharzia eggs. An examination of eggs in urine during treatment shows that the number diminishes and in about 8–9 days granular and degenerative changes are observed. Watery solutions of tartar emetic *in vitro* have a distinct action on ova. Antimony, he claims, does have a real effect on the ova, second in importance only to that on the adult parasite, which it later kills.

In reply Khalil points out that his experiments were designed not to show that tartar emetic had no lethal effect on Bilharzia eggs but to demonstrate the obvious fallacy underlying the test tube experiments whereby Christopherson had attempted to prove *in vitro* the accepted fact that in some way tartar emetic kills the Bilharzia ova *in vivo*.

R. T. L.

Cawston (F. G.). **Estimation of the Cure of Bilharziasis.** [Memoranda.]—*Brit. Med. Jl.* 1927. Mar. 19. p. 512.

Absence of ova during treatment does not signify cure, and until six weeks or so have passed without ova it is unsafe to consider the case as cured.

T. W. M. C.

Fairley (N. Hamilton). **The Early Spontaneous Cure of Bilharziosis (*S. spindalis*) in Monkeys (*Macacus sinicus*) and its Bearing on Species Immunity.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 685–700. With 3 graphs & 3 figs. on 1 plate. [21 refs.]

Fairley finds that cercaria of *S. spindalis*, a natural parasite of the goat and other ruminants, will penetrate the skin of monkeys and

develop to a certain extent in these animals. Schistosomulae were recovered 11 days after infection : 23 days after infection, parasites were absent but pathological lesions were still seen : 124 days after infection there was no trace at all. In these monkeys there had been a positive complement fixation test which rapidly rose and gradually declined. Experiments in goats demonstrated that the presence of a high antibody content in the blood could not be the cause of the disappearance of the parasite and Fairley suggests that this is an example of natural rather than acquired immunity. Man is also naturally immune.

T. W. M. C.

Fairley (N. Hamilton) & Jasudasin (F.). **The Experimental Transmission of *S. spindalis* to the Indian Water Buffalo.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 701–706. With 1 chart & 2 figs. on 1 plate. [3 refs.]

Fairley has successfully transmitted *Schistosoma spindalis* to two water buffaloes and the lesions and serological reactions in these animals are described. He believes that the buffalo will prove to be one of the main reservoir hosts of the parasite.

T. W. M. C.

Fairley (N. Hamilton). **Complement Fixation with Bilharzia. Part II. –The Production of Specific Antibody by Intravenous Injections of Protein-Free Alcohol-Soluble Cercarial Extracts.**—*Jl. Path. & Bact.* 1927. Jan. Vol. 30. No. 1. pp. 97–112. With 6 text figs. [41 refs.]

The first part of Fairley's paper (this *Bulletin*, Vol. 23, p. 247–8) showed that alcoholic extracts of fresh livers of snails infected with *Schistosoma spindalis* acted specifically at high titres in complement fixation tests with goats. This substance is protein free and appears to be of a lipoidal nature. In the present research, the object was to determine whether any anti-body response occurred in normal or in infected goats, which are natural hosts of *S. spindalis*, following the injection of alcohol-soluble cercarial extract. Under normal circumstances, there is a maximum fixation of 1½ M.H. Doses. In non-infected and in cured goats, it appeared that, after a latent period of 1–2 weeks, antibody appeared in the serum but the maximal rise was small (up to 7½ M.H.D.). In infected animals and in those receiving a second series of injections, there was a decisive rise of antibody content within a few days of the injection and a high maximum antibody response (up to 27–60 M.H.D. and 12 M.H.D., respectively). Fairley concludes that these extracts function as true antigen and points out that a decisive rise within the first five days of injection is pathognomonic of schistosomiasis. As the extracts used are protein free there is no danger of anaphylaxis, and Fairley hopes that a similar type of injection with alcohol-soluble scolex antigen in hydatid, etc., may assist the ordinary serological methods of diagnosis.

T. W. M. C.

Lampe (P. H. J.). Pathologisch-anatomische Veränderungen bei Bilharziasis mansoni. [**Pathological Changes in *S. mansoni* Infection.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Sept. 13. Vol. 30. No. 9. pp. 475–484. With 4 text figs.

In heavy infections with *Schistosoma mansoni* alterations in the lung are common. Miliary bilharziasis of the lung, liver, stomach, intestine,

heart and lymph glands is difficult to distinguish macroscopically from miliary tuberculosis. The author points out that in spite of negative examinations of the stool, severe changes in organs or tissues may be due to this parasite. In endemic centres, other conditions, as appendicitis, peritonitis, bronchitis, asthma, etc., are sometimes due to this worm, although the true cause can only be found on microscopic examination on autopsy.

R. T. L.

Roman (Benjamin) & Burke (Alice). **A Case of Carcinoma of the Colon associated with Schistosomiasis (Bilharziosis) in a Young Woman.** – *Amer. Jl. Path.* 1926. Nov. Vol. 2. No. 6 (Whole No. 12). pp. 539–544. With 6 figs. on 3 plates. [14 refs.]

The authors record the finding of an abdominal colloid adenocarcinoma involving the splenic flexure of the colon. The tumour contained many ova of *S. mansoni*, especially in its peripheral parts and in the adjacent parts of the colon, where adult worms were also found. While pointing out that in this case the two conditions might well be regarded as coincident, the authors believe that the parasites might in some way be responsible for the carcinoma.

R. T. L.

Maciel (Heraldo). A influencia das forças cosmicas sobre a postura do *Schistosoma mansoni*. **Influence of Cosmic Forces on the Egg-Laying of** *S. mansoni*.]—*Sciencia Med.* 1926. Nov. 30. Vol. 4. No. 11. pp. 588–594. [4 refs.]

Eggs of *S. mansoni* are passed out of the body normally within 24 hours of being laid. Temperature appears to play little part, but barometric pressure exercises a considerable effect on the egg-laying of the worm—a low pressure increasing the output. Examination of suspected stools for the ova is accordingly best made during a period of low pressure. In computing an "endemic index" for an area, this must be taken into consideration.

T. W. M. C.

Fujinami (Akira). **Historical Review of Scientific Investigations on the Pathology of Schistosomiasis in Japan, and Efforts for the Eradication of this Disease.** – *Japan Med. World.* 1926. Nov. 15. Vol. 6. No. 11. pp. 304–308.

Fujinami divides the history of the pathology of *S. japonicum* into five periods, viz.: (1) from the time when a characteristic clinical picture was first noted until the nature of the disease was discovered by pathologico-anatomical examination; (2) until the discovery of the parasite—first seen by Katsura in a cat and by the author in man; (3) until the route of infection was discovered to be through the skin by experiments on calves in 1909; (4) until the discovery of the intermediate host (Fujinami unfortunately omits all reference to the work of Leiper and Atkinson at this period); (5) subsequent to that time, when eradication was commenced.

The author then discusses prophylactic measures under the headings of Protection of the skin against invasion, Destruction of the egg in the faeces, and Destruction of the cercaria and snails.

T. W. M. C.

Miyagawa (Yoneji). **Schistosomum Japonicum : its Life-History and Treatment with Stibnal.**—*Japan Med. World.* 1926. Sept. 15. Vol. 6. No. 9. pp. 229–232.

After a brief review of the life-cycles of the schistosomes, Miyagawa points out that in 1911 Tsuchiya found that large doses of quinine hydrochloride injected intravenously killed the parasite. Nishi in 1921–23 used sodium antimony tartrate (Stibnal) in doses of ·005 gm. per kilo body weight in dogs but later found that a smaller dose was equally effective in the treatment of *S. japonicum*. The author has used the same drug successfully in man ; lately, however, he has tried a slightly alkaline solution of the drug which he calls " Neostibnal " in place of the older acid preparation. This proved less toxic but equally efficient. The drug is very successful if given in cases that are not too far advanced.

R. T. L.

Fulton (Roland A. H.) with Addendum by Barnett (L. E.). **Hydatid Disease in Man. A Clinical Study, with a Note on the Incidence of the Disease in New Zealand.**—*New Zealand Med. Jl.* 1926. Dec. Vol. 25. No. 130. pp. 317–323.

In the twelve years ending 1925, 90 cases of hydatid have been admitted to Dunedin general hospital, 75 of these being primary admissions, the remainder recurrent cases. Of the 90 cases, incorrect or no diagnosis was made in 50. The mortality was 23·3 per cent. No death, however, has occurred in clean liver hydatid where the " no-drain " operation has been employed. An analysis of the statistics for the whole of New Zealand shows that admissions have increased from 186 in the 1894–1898 period to 373 in the 1919–1925 period. Barnett estimates that approximately 150 cases occur yearly with a death rate of 15 per cent. 50 per cent. of all animals slaughtered are infected.

T. W. M. C.

Senevet (G.) & Witas (P.). Enquête sur l'échinococcose en Algérie. Première partie.—Les cas humains de kyste hydatique. [**Hydatids in Man in Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Sept. Vol. 4. No. 3. pp. 343–456. With 2 folding maps.

Dévé in 1923 (this *Bulletin*, Vol. 21, p. 556) investigated the problem of hydatid in Tunis and Barotte and Velu have performed a similar task for Morocco. The present writers have completed the survey of north Africa by their enquiry in Algeria. The first part of this forms the present paper and deals with the incidence in man in that area. They have calculated a " hydatid Index " for the various areas ($= \frac{\text{av. no. per year}}{\text{no. of inhabitants}} \times$ a million) for the period 1900–1925 and get an average figure of 15. The disease is commonest in the steppe-like regions of the high plateaux. Dévé has found that in similar regions in Morocco the heaviest infections were found. The maximum number of cysts was found between the ages of 10 and 30 years and the liver is most commonly infected.

T. W. M. C.

Cameron (Thomas W. M.). **Some Modern Biological Conceptions of Hydatid.**—*Proc. Roy. Soc. Med.* 1927. Jan. Vol. 20. No. 3. pp. 272–283 (Sect. Trop. Dis. & Parasit. pp. 6–17). With 6 text figs.

This is a résumé of the most recent work on the life-history of the hydatid parasite and includes not only an account of the normal life cycle, but also discusses the formation of daughter cysts, bovine multilocular cysts and alveolar hydatid in man.

R. T. L.

Hercus (C. E.). **Laboratory Aids in the Diagnosis of Hydatid Disease.** —*New Zealand Med. Jl.* 1926. Dec. Vol. 25. No. 130. pp. 323–335. With 1 diagram & 1 graph. [8 refs.]

This is a general discussion of the various laboratory tests for hydatid —microscopic and biological. The author does not use the precipitin test as he considers the complement fixation better. This is stated by the French workers to have a pre-operative value of only 20 per cent., by Fairley to be over 90 per cent., and by the writer to be about 58 per cent. A small number of pseudo-positive results occur. He finds that its greatest value lies in testing post-operative cases to determine whether all the cysts have been removed by the surgeon. A strongly positive reaction persisting for a year after operation is absolutely diagnostic of the existence of another cyst. The intradermal test is over 90 per cent. accurate and is now used as a routine measure in Dunedin Hospital ; a control injection of 1 per cent. peptone is essential to avoid pseudo-positive results. This test is useless for recurrent infections.

T. W. M. C.

Hiles (I.). **Serological Studies on Hydatid.**— *Jl. Helminthology.* 1926. Nov. Vol. 4. No. 4–5. pp. 143–178. [118 refs.]

Miss Hiles reviews the literature dealing with the serological tests for the diagnosis of hydatid disease and concludes that the consensus of recent opinion is that the Casoni reaction is the most reliable. She conducted a series of experiments to investigate the value of the complement fixation test and the possibility of preparing a concentrated stock antigen, especially in countries where the cysts are not too common in domestic animals, to replace the fresh hydatid fluid used where they are prevalent. She found that alcoholic extracts of scolices were more potent than most hydatid fluids —especially those prepared from dried scolices. The possible interference of alcohol in the reaction is obviated by making very concentrated extracts which must be diluted greatly with saline before use. Slow emulsification and the addition of cholesterol enhanced the reaction.

T. W. M. C.

Hiles (Isa). **Serological Tests for Hydatid Disease.** — *Proc. Roy. Soc. Med.* 1927. Mar. Vol. 20. No. 5. pp. 708–713 (Sect. Trop. Dis. & Parasit. pp. 26–31). [4 refs.]

Miss Hiles describes in detail the technique for carrying out the three standard tests for the presence of Hydatid (Complement fixation, Precipitin and Intradermal). The paper does not lend itself to abstraction and should be consulted in the original.

T. W. M. C.

Ichok (G.). Le diagnostic de l'échinococcose à l'aide de l'intradermoréaction. [**Diagnosis of Hydatid by the Intradermal Reaction.**]—*Presse Méd.* 1927. Jan. 26. Vol. 35. No. 8. pp. 118–119. [11 refs.]

This is a review of the recent work on the intradermal test for hydatid. The author concludes that it is superior to all the other reactions. Curiously enough, the reaction is reduced after a positive cutireaction for tuberculosis, but not after the injection of a variety of other substances, including anti-typhoid vaccine.

T. W. M. C.

Serigós (Ernesto). Nuevo procedimento que permite obtener reacciones más sensibles. Posibilidad de descubrir quistes hidáticos de difícil diagnóstico. (Nota previa). [**Diagnosis of Obscure Hydatid Cysts.**] –*Semana Méd.* 1926. Nov. 18. Vol. 33. No. 46 (1714). pp. 1374–1375.

The author believes that the injection of hydatid fluid in the intradermal test should be into the skin in the region nearest to the hydatid focus ("proximal intradermal reaction"), since the reaction is much more pronounced there. The further the injection from the site of the cyst, the less severe the reaction; by this means it is possible to locate a cyst otherwise difficult to diagnose.

T. W. M. C.

Lemaire (G.) & Thiodet (J.). Résultats comparés des différentes méthodes biologiques de diagnostic des kystes hydatiques. Réaction de Casoni. [**Comparison of the Biological Methods of Diagnosis of Hydatids.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Mar. Vol. 4. No. 1. pp. 71–82. [3 refs.]

Four biological methods of diagnosing hydatid are in use at the present day, viz.; (1) eosinophilia; (2) complement fixation; (3) precipitin reaction; (4) the intradermal test, and the authors have made an interesting study of the comparative value of these. The second and the fourth give the smallest number of positive results which are not justified and they consider that they are of great use. The second is perhaps not sensitive enough regularly to confirm the clinical diagnosis, and it varies more than the others under the different antigenic properties of hydatid fluid. They find that it and the precipitin test give about 17 per cent. of positive results. The intradermal test, on the other hand, gives 87 per cent. of positive results and appears not only to be the most sensitive but the most useful for the clinician. They control this test with an intradermal injection of peptone broth.

T. W. M. C.

Escudero (P.), Escudero (A.) & Peco (G.). Sobre el valor de la intradermorreacción hidatidica. [**The Value of the Intradermal Reaction for Hydatids.**] –*Semana Méd.* 1926. Sept. 2. Vol. 33. No. 35 (1703). pp. 585–586. [2 refs.]

From experiments on 20 subjects, the authors conclude that the intradermal test for hydatid loses its value as a diagnostic test after

the first injection, since injections into persons free from cysts render them positive to subsequent injections. They believe that the sero-reaction of Imaz-Lorentz is the only specific test.

T. W. M. C.

Horowitz-Wlassowa (L.). Zur Frage des serologischen Nachweises der Echinokokkeninfektion. [**Serological Diagnosis of Echinococcus Infection.**]—*Deut. Med. Woch.* 1926. Jan. 22. Vol. 52. No. 4. pp. 147–148. [32 refs.]

The Ghedini-Weinberg reaction for the diagnosis of hydatid infection is successful in 90–95 per cent. of cases and seems to be strictly specific. The author finds that a pellucid hydatid fluid has no antigenic power and that even small doses of a cloudy fluid containing products of degeneration, are active. The antigen is lipoidal in nature and heating to 55° C. does not destroy it.

T. W. M. C.

Pessôa (S. B.), da Silveira (G. Fleury) & Corrêa (Clovis). Sobre a producção de anti-corpos especificos por meio de injecções experimentaes de extracto total de *Cysticercus cellulosae*. [**Production of Antibodies by Injection of Total Extract of** *C. cellulosae*.]—*Brazil-Medico.* 1926. Oct. 23. Year 40. Vol. 2. No. 17. pp. 235–236. [4 refs.]

Diagnosis of cysticercus infection in the laboratory is usually by deviation of the complement, the antigen being an aqueous solution of cysticerci. Other reactions (precipitin, eosinophilia) in the author's opinion have only a relative value. Hydatid is now often diagnosed by an intradermal test. The authors have adopted a similar technique for *Cysticercus cellulosae*, using an antigen prepared from cysts from the pig.

R. T. L.

Pessôa (S. B.), da Silveira (G. Fleury) & Corrêa (C.). Reacção do desvio do complemento na cysticercose a *Cysticercus cellulosae*, usando-se como antigeno extracto de *Cysticercus bovis*. [**Deviation of Complement in** *C. cellulosae* **Infection with Extract of** *C. bovis* **as Antigen.**]—*Brazil-Medico.* 1926. Dec. 18. Year 40. Vol. 2. No. 25. p. 347. [5 refs.]

The authors have injected extracts of *Cysticercus cellulosae* into rabbits and found that their serum gave positive results with either *C. cellulosae* or *C. bovis* as an antigen. Controls were negative. Similarly a man with *C. cellulosae* infection of the eye gave positive results with *both* antigens, while an uninfected man was negative.

T. W. M. C.

Lemaire, Thiodet & Derrien. Sur la nature du poison hydatique. [**The Nature of the Hydatid Poison.**]—*C.R. Soc. Biol.* 1926. Dec. 17. Vol. 95. No. 37. pp. 1485–1487. [1 ref.]

The hydatid poison is not albuminous as it can be dialysed and the fluid so recovered is not affected by boiling. The addition of alcohol causes its precipitation as a white amorphous powder, easily soluble in distilled water, when it may be used for the intradermal reaction. The

toxin appears to be a polypeptide. The authors recommend the use of dialysed hydatid fluid for the Casoni reaction instead of the entire fluid.

T. W. M. C.

Coutelen (F.). Essai de culture *in vitro* de scolex et d'hydatides échinococciques (*Echinococcus granulosus*). [**Culture in vitro of Scolex and Hydatid.**]—*Ann. Parasit. Humaine et Comparée.* 1927. Jan. 1. Vol. 5. No. 1. pp. 1–19. With 2 figs. [24 refs.]

Coutelen has been able to keep scolices of Echinococcus alive in hydatid fluid for a month—under aerobic and partially anaerobic conditions—and finds that they increase to nearly thirty times their original size. Daughter cysts have been similarly kept alive for a week. The scolices will not live in an acid medium (the pH value of normal hydatid fluid is 7·4) and can live under a variety of conditions of temperature, the optimum being 37°–39° C.

T. W. M. C.

Derrien (E.). Porphyrines et vers parasites. [**Porphyrins and Parasitic Worms.**]—*C.R. Acad. Sci.* 1927. Feb. 21. Vol. 184. No. 8. pp. 480–481. [4 refs.]

" Ultraparaviolet " light causes, in the depth of the meat, cysticerci to glow with a red inflorescence (due to the presence of protoporphyrin), and it is suggested that this fact may be of value in diagnosis.

T. W. M. C.

Novaro (Raúl). Hidatidosis hepática. [**Hydatid of the Liver.**]—*An. Inst. Modelo Clin. Méd.* Buenos Aires. 1924–25. Vol. 9. No. 1. pp. 70–89. With 13 figs.

This is the substance of a post-graduate lecture giving a general account of hydatid, its topographical and geographical incidence, its morphology and life history, the symptoms of the disease and its diagnosis by X-rays, biological methods and by the presence of eosinophilia. Special attention is paid to the intradermal test and an excellent coloured plate of this reaction is given.

T. W. M. C.

Dévé (F.). Kyste hydatique et radiothérapie. [**Hydatid and Radiotherapy.**]—*Presse Méd.* 1927. Feb. 12. Vol. 35. No. 13. pp. 193–195. [20 refs.]

Dévé states that radiotherapy for hydatid infection, with the apparatus to-day available, is quite impossible—and this will probably be the case for some time.

T. W. M. C.

Bacigalupo (Juan). *Hymenolepis intermedius* (nueva especie). Su evolución. [*H. intermedius* **n. sp.**]—*Semana Méd.* 1927. Jan. 27. Vol. 34. No. 4 (1724). pp. 229–230. With 2 text figs.

In studying the species of Hymenolepis in man and rats, the author has encountered a new species which he names *H. intermedius*. It is 5 to 12 cm. long with a scolex armed with 32 hooks (15–20μ long).

The active hexacanth embryo develops into a cysticercoid in *Tenebrio molitor*. Feeding this to white rats produced the adult. The author was also able to infect adult Tenebrios with *H. nana*. [It is not stated whether man or the rat was the original host of the new species.]

T. W. M. C.

Gundrum (F. F.) & Snyder (J. R.). *Hymenolepis diminuta*. **Report of a Case.**—*California & Western Med.* 1927. Mar. Vol. 26. No. 3. pp. 350–351.

This is the record of an infection with *H. diminuta* in a child of 15 months. There were 8 worms in all and they caused symptoms of enteritis. The infection was possibly conveyed to the child through its father, who worked in a granary and may have brought the intermediate host home with him.

T. W. M. C.

Herszky (Paul). Bandwurm-Ileus. [**Tapeworm-Ileus.**]—*Deut. Med. Woch.* 1927. Jan. 21. Vol. 53. No. 4. pp. 144–145. With 2 text figs. [14 refs.]

Herszky records an impaction of the ileum with a specimen of *Taenia solium*, 3 metres long, which caused a spasmodic colitis. Removal of the worm relieved the condition.

Burnet (James). **A Case of Severe Chorea associated with Tapeworm, with Remarks on the Treatment of this Disease.**—*Lancet.* 1927. Mar. 19. pp. 600–601. [1 ref.]

After the expulsion of a tapeworm, the movements ceased in a case of chorea in a girl of 9½ years who was distinctly rheumatic.

Benedict (Edward B.). *Taenia saginata* **in the Gall Bladder.**—*Jl. Amer. Med. Assoc.* 1926. Dec. 4. Vol. 87. No. 23. p. 1917.

Benedict records the occurrence of a complete *Taenia saginata* in the gall-bladder of an old man. He was operated upon for acute chole cystitis and the tapeworm—ten feet long—removed. The patient was discharged 17 days after the operation.

R. T. L.

Prates (Manuel Maximo) & Pinto (Francisco da Silva). Um curioso caso de helmintiase. [**An Unusual Case of Helminthiasis.**]—*Revista Méd. de Angola.* (No. especial 1e Congresso de Med. Trop. da Africa Ocidental. Vol. 4. 6a, 7a e 8a Sessões.) 1923. Aug. No. 4. pp. 389–395.

The authors record an infection with *Dipylidium caninum*, the tapeworm when expelled measuring 55 cm. in length. Radical cure with Male fern proved difficult.

T. W. M. C.

Schneider (Hans). Weitere Erfahrungen ueber die Bandwurmkur mittels der Duodenalsonde. [**Further Experiences in the Treatment of Tape Worm by means of the Duodenal Sound.**]—*Muench. Med. Woch.* 1926. Aug. 20. Vol. 73. No. 34. pp. 1403–1407. [2 refs.]

Schneider has now administered male fern to a second series of 87 patients infected with Taenia with 62 successful results (see this

Bulletin, Vol. 21, p. 554) and finds that administration with the duodenal sound is superior to the more usual "Capsule" method.

T. W. M. C.

Kogan (D. A.). Zur Technic der Behandlung der Bandwürmer mit der dünnen Magensonde. [**Technique of Treatment of Tape Worm with the Stomach Sound.**]—*Jl. Méd. de l'Asie Centrale.* Tashkent. 1926. Vol. 5. No. 1. German summary p. 36. [In Russian pp. 31–35. 2 refs.]

By the administration of male fern through the duodenal sound tapeworms, with rare exceptions, are expelled. Male fern when administered by this method is given in the usual dosage.

R. T. L.

Casaux & Houdemer. Note préliminaire sur les sparganoses humaines et animales au Tonkin. [**Human and Animal Sparganoses in Tonkin.**]—*Bull. Soc. Path. Exot.* 1926. Nov. 10. Vol. 19. No. 9. pp. 802–804.

Sparganum in man and animals is relatively common in Tonkin. 80 per cent. of the frogs are infected while snakes and a civet were also heavily parasitized. Other common hosts are the pig, monkey, rats and numerous species of birds. Each year 7 or 8 cases of human ocular sparganosis are treated at Hanoi. Infection is probably from the cyclops. Cats are infected with the adult to the extent of 14·2 per cent., dogs to 12·1 per cent.

The parasite lives for preference in the connective tissue of animals and the orbit of man. The first are not capsulated and cause no symptoms: the second are capsulated, cause a considerable reaction, and are very active.

T. W. M. C.

Krause (E.). **About** *Bot[h]riocephalus Latus.*—*Harefuah.* Jerusalem. 1926. Oct.–Nov. Vol. 2. No. 1. English summary pp. VII–IX. [In Hebrew pp. 328–330.]

Previous to the author's work, only one case of Bothriocephalus infection had been recorded from Palestine—and that from Jerusalem. She records two cases from Haifa one at least of which had apparently been contracted from Lake Tiberias, where the "Barbus" and *Perca fluviatilis* occur.

R. T. L.

MacDonagh (Emiliano J.). Parásitos de peces comestibles. II.—Larvas de un cestode trypanorrinchido de la pescadilla. [**Parasites of Edible Fishes. II. Larvae of a Trypanorrinchid Cestode from the Pescadilla.**]—*Semana Méd.* 1927. Feb. 10. Vol. 34. No. 6 (1726). pp. 373–376. With 7 text figs.

The pescadilla (*Cynoscion striatus*) [a member of a large group of edible fishes often very incorrectly known as "sea trout"] is commonly eaten in South America. It is often parasitized by the large larvae of a Trypanorrinchid cestode which is here described in some detail. These larvae are innocuous to man, and although they might be mistaken for plerocercoids of Bothriocephalus, they are easily distinguished by the shape of the head.

T. W. M. C.

Stepanow-Grigoriew (J.) & Hoeppli (R.). Ueber Beziehungen zwischen Glykogengehalt parasitischer Nematodenlarven und ihrer Wanderung im Wirtskörper. [**Relation between Glycogen Content of Parasitic Nematodes and their Migrations in the Host.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Sept. 13. Vol. 30. No. 9. pp. 577–585. [18 refs.]

The writers have estimated histologically the glycogen content of the larvae of Ascaris, Strongyloides and *Uncinaria stenocephala* of the dog in order to test Pinter's hypothesis, with which they agree, that these larvae migrate into the blood-stream on account of their need for this substance. They find that in the egg of Ascaris, the embryo in the egg and the larva from the lung, glycogen is present. There are traces in the gut of the young infective larva of Strongyloides which decrease as it grows older; traces are also found in the free-living generation. In larvae of Uncinaria which had grown experimentally in the gut of a tracheotomized dog and which had not passed through the blood stream, traces could also be found.

T. W. M. C.

Fülleborn (F.). Hautquaddeln und "Autoinfektion" bei Strongyloidesträgern. [**Skin Wheals and "Autoinfection" in Strongyloides Carriers.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Dec. Vol. 30. No. 12. pp. 721–732. [13 refs.]

The penetration of human skin by individual larvae of *Strongyloides stercoralis* causes a transient itching which rapidly disappears. Only a proportion of the larvae succeed in penetrating the skin: where the skin is tender this is easier than where it is thick, and it is easier in young than in old people. In a man (the writer) of 59 years of age, a larva penetrated the skin of the forearm only where the epidermis was broken.

In an experiment on a person who had already been a Strongyloides carrier for many years, there developed, with severe itching, large urticarial-like wheals which within a few hours extended along the skin and which obviously had been caused by larvae creeping further inside the skin. After these wheals have disappeared for weeks, they can be provoked again simply by rubbing the skin at the old spot.

After the skin had been penetrated by the larvae at the tip of the fingers, the whole of the anterior surface of the hand gradually swelled, and violent itching mostly nocturnal appeared which lasted for a week or longer.

In nearly all the Strongyloides carriers observed by Fülleborn, there occasionally occurred in the anal region large itching urticarial wheals, obviously the result of penetration of the skin in this region by the larvae which have developed in minute traces of faecal material remaining at the anus. The skin for this reason, and because of repeated infections, seems to acquire a strong local hypersensitivity. In a carrier spontaneously suffering from these wheals, similar wheals could be produced experimentally by introducing Strongyloides larvae into the anal cleft. Moreover, inoculation of the skin of the forearm with an antigen consisting of powdered Strongyloides larvae caused the formation of similar wheals in all the cases observed by Fülleborn.

This penetration of the skin of the anal region by the larvae must

give rise to a permanent new infection and may be the cause of the long persistence of the infection in the intestine: in one of Fülleborn's cases, this persisted for 24 years. He can give no other explanation. Experiments with larvae of *Rhabdias bufonis*, which lives in the lung of the frog, suggest that in hosts infected with species belonging to this group of Nematodes some substance may develop which can inhibit the further development of the young of these parasites inside the body of the host.

T. W. M. C.

Fülleborn (F.). Spezifische Kutanreaktionen bei Infektion mit Strongyloides und anderen Helminthen. [**Specific Skin Reactions in Infestation with Strongyloides and other Helminths.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Dec. Vol. 30. No. 12. pp. 732–749. With 3 text figs. [25 refs.]

Fülleborn finds that inoculation with an antigen prepared from powdered infective larvae of *Strongyloides stercoralis* has proved to be a very convenient and useful diagnostic method in infection with this parasite. A similar but less powerful reaction is also given by an antigen prepared from the free-living sexual generation.

The skin reaction for Strongyloides appears also when Ascaris or Trichinella antigens are used: but skin reacting to Ascaris antigen is not sensitive to Strongyloides antigen. In the presence of a general skin allergy (i.e., in a positive reaction to intradermal inoculation with extract of human "scalp-scales," according to van Leeuwen) there may be a positive reaction to Strongyloides antigen although the patient does not harbour the parasite.

Apart from this exception, it appears that a positive infection with Ascaris antigen indicates an Ascaris infection. But as this reaction may apparently remain positive for years after the parasites have been expelled, its value for diagnostic purposes is very slight. In strong Ascaris reactions, the skin appears to become sensitive to Trichinella antigen also.

Fülleborn finds that an acquired hypersensitivity, in persons working with Ascaris material, could not be transferred by means of the blood to guineapigs.

He was not successful in producing swellings by inoculations with powdered *Loa loa* into a patient predisposed to Calabar swellings, although these are obviously a reaction of the host's body to Loa antigen. However, he considers that this experiment requires repetition.

He concludes by discussing the practical value of intradermal tests for helminthic infections. With the exception of the Casoni reaction for hydatid, they do not appear to be very reliable. The specific reaction for Strongyloides is very useful but is still without any considerable practical importance. He considers that the following reactions may be of value: a cutaneous reaction for *Cysticercus cellulosae* infection, or for chronic trichinosis, or in incipient bilharziasis—in the latter theoretical conditions for its success are apparently favourable. In other cases, too much reliance cannot yet be placed on the diagnostic value of skin-reactions.

T. W. M. C.

Fülleborn (F.). Demonstration ueber Kutanreaktion bei Helminthenaffektionen. [**Demonstration of Skin Reactions in Helminth Infections.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Vol. 30. No. 1. pp. 86–87.

Pulverized infective larvae of Strongyloides rubbed into skin abrasions of seven Strongyloides patients supersensitized by long infection caused a marked urticaria rash in a few minutes. (This was quite distinct from the nettle rash arising spontaneously in such persons as the result of reinfections due to uncleanly habits.) This cutaneous reaction appeared specific (the controls were negative) and to be more reliable than the cultivation procedure. A slight rash, however, was also produced using a similarly prepared Ascaris antigen.

The results suggest that similar methods might prove of practical value in diagnosis of other helminthic infections.

R. T. L.

Mazza (Salvador) & Cossio Echitcofar (Máximo). Consideraciones sobre un foco de anquilulosis en la provincia de Tucumán. [**A Focus of Strongyloidosis in Tucuman.**] *Bol. Inst. Clin. Quirurg.* Buenos Aires. 1926. No. 14, 15 & 16. 7 pp. With 1 text fig. [5 refs.]

Near Tucuman there is a small focus of *Strongyloides* infection, 10 to 12 per cent. of the population being infected. Many of the infected persons showed clinical symptoms—repeated diarrhoeal crises and slight anaemia, sometimes with an itching eruption resembling purpura.

R. T. L.

Robitschek (Walter). Invasion von *Strongyloides intestinalis* in den Urogenitaltrakt. [**Invasion of the Urogenital Tract by** *S. intestinalis.*] —*Cent. f. Bakt.* I. Abt. Orig. 1927. Feb. 5. Vol. 101. No. 6-7. p. 419.

Robitschek records a case of infection of the urino-genital tract of a patient of 55 years with *Strongyloides intestinalis.*

R. T. L.

Ortlepp (R. J.). **On the Identity of** *Physaloptera caucasica* **v. Linstow, 1906, and** *Physaloptera mordens* **Leiper, 1908.** *Jl. Helminthology.* 1926. Nov. Vol. 4. No. 4–5. pp. 199–202. With 3 text figs. [2 refs.]

Physaloptera mordens differed very considerably from v. Linstow's description of *P. caucasica*, the other human species. In view, however, of Schulz's description of the type of the latter species (this *Bulletin*, Vol. 23, p. 254) Ortlepp has re-examined the types of *P. mordens* and finds that they are identical. The latter name accordingly becomes a synonym of *P. caucasica*.

T. W. M. C.

Lee (C. U.). **Filariasis Investigations in the Province of Kiang Su, China.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Nov. 25. Vol. 20. No. 4. pp. 279–287. With 1 map, 1 plate & 1 chart. [8 refs.]

An endemic area of *Filaria bancrofti* exists in Hsüchowfu and Lee has made a brief investigation of this centre. According to local information elephantiasis does not occur on the south side of the Yangtze at Chinkiang, although it is not uncommon on the north side. In

Hsüchowfu the filarial rate is 3·8 per cent., and cases of clinical filariasis are rare: in Tsing Kiang Pu it is 15·9 per cent. and cases are common; yet numerous cases of elephantiasis were seen in both areas.

Lee points out that the determination of the species of mosquito used by Manson in his original work at Amoy has never been verified. It has been assumed that *Culex fatigans* is the only Chinese vector. In the above districts this species was absent, while *C. pipiens* was common and was frequently found infected. Some excellent microphotographs of these stages in the mosquito are given.

R. T. L.

Gomperts (H. C.). Aanteekeningen betreffende Filaria-onderzoek onder verschillende bevolkingsgroepen in Nederlandsch-Indië. [**Filarial Findings in Different Population Groups in Dutch East India.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1926. Vol. 66. No. 5. pp. 598–602. [2 refs.]

Flu (1916) found that 23·4 per cent. of the prisoners at Weltevreden harboured *Microfilaria bancrofti*, those coming from Batavia having a 3 per cent. infection. Gomperts has examined 708 persons at Soekaboemi and, grouping them according to their origin, finds an infection of 18 per cent. at Atjehers. A similar examination at Bandoeng in 1922 showed that while none of the residents were infected, imported Chinese labourers showed a 4·3 per cent. infection. There was no infection among the Madoereezen at Soerabaia in 1925.

It is recognized that only about 10 per cent. of infected persons show symptoms; but the author found no symptoms at all among the infected at Soerabaia. He considers that this is due to "physical selection," all the Chinese there being either soldiers or labourers who must be fit or would otherwise be deported.

He finds that the larvae will develop in *Culex fatigans* at an optimum temperature of 25° C. but can develop at lower temperatures as at Bandoeng, where complete development takes 14 days.

T. W. M. C.

Hughens (H. V.). **Filariasis. Report on 1,742 Persons observed in St. Croix, Virgin Islands.**—*U.S. Nav. Med. Bull.* 1927. Jan. Vol. 25. No. 1. pp. 111–117. With 1 chart in text.

Hughens is impressed with the large number of persons suffering from elephantiasis in the Virgin Islands and he believes that the incidence of infection depends on the prevalence of *Aëdes variegatus* and the repeated inoculation of persons by the infected mosquitoes over a long period. The lowered resistance about puberty seems to be a contributing factor to the appearance of the microfilaria in the blood. There is a considerable drop in clinical manifestations between the ages of 14 and 25, which, however, subsequently rises, and it is suggested that this fall and rise may be due to blocking of the lymphatics by adult Filaria worms and subsequent reinfection.

R. T. L.

Korke (Vishnu T.). **Observations on Filariasis in some Areas in British India. Preliminary Investigation.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 717–732. With 15 figs. on 1 plate. [9 refs.]

Of 166 cases examined in Bihar and Orissa, Korke finds that 19 per cent. show microfilaria in the blood, not all of which agree in his opinion with the standard conception of *M. bancrofti*.

Suganuma (S.). **A Case of Teratoid Tumor, in which** *Filaria bancrofti* **? was found.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1927. Jan. No. 262. English summary p. 4 [In Japanese.]

A tumour recovered from the abdomen of a child of six months contained pieces of a nematode which may have been *F. bancrofti*. The surrounding tissues showed inflammatory infiltration and a tendency to malignant changes.

Ziemann (Hans). Ein Fall von Filaria-loa-Infektion mit mindestens 17 jähriger Dauer. [**A Case of Loa Infection of at least 17 Years' Duration.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Sept. 13. Vol. 30, No. 9. pp. 626–628. [1 ref.]

Ziemann records a case of *Loa loa* infection which apparently persisted for at least 17 years without causing clinical symptoms.

R. T. L.

Vogel (H.). Beiträge zur Anatomie der Gattungen *Dirofilaria* und *Loa*. [**Morphological Study of the Genera** *Dirofilaria* **and** *Loa*.] —*Cent. f. Bakt.* I. Abt. Orig. 1927. Mar. 8. Vol 102. No. 1-3. pp. 81–89. With 13 text figs. [7 refs.]

This is a morphological description of *D. immitis* and *D. repens* of the dog and *Loa papionis* v *St. pauli* of *Ateles paniccus* from South America. The tail of the male *Loa loa* is also figured

T. W. M. C.

Blacklock (D. B.). **The Insect Transmission of** *Onchocerca volvulus* **(Leuckart, 1893), the Cause of Worm Nodules in Man in Africa.**—*Brit. Med. Jl.* 1927. Jan. 22. pp. 129–133. With 2 text figs. [10 refs.]

The detailed information on which this paper is based has already been noticed (this *Bulletin*, Vol. 23, p. 762). Blacklock in this general lecture states that over 45 per cent. of the inhabitants of Konno (Sierra Leone) are infected but only 40 per cent. of those infected possess nodules: 16 per cent. of these who had nodules did not appear to be infected. The larvae, ingested by *Simulium damnosum*, leave the gut within twenty-four hours, and within forty-eight hours have reached the thorax, by which time they have become stumpy forms with a characteristic caudal appendage. After several moults, they pass to the head and proboscis—about seven or more days after infection. Heavy infections appear to be fatal to the insect. The Simulium is found in shady parts near water and prefers to feed mainly when the sun is low, and bites especially below the waist.

Blacklock discusses the central American form and suggests that the frequent appearance of cephalic nodules there may be due to the fact that coffee is grown under overhead shade and the workers usually wear trousers and footwear.

T. M. W. C.

Fülleborn (F.). Zur Onchocerca-caecutiens-Frage. [**The *Onchocerca caecutiens* Question.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. May 1. Vol. 30. No. 5. pp. 189–195. [7 refs.]

This article contains the summary of a lecture given at the International Conference of Hygiene at Kingston, Jamaica, in 1924 in order to make clear certain points which had been misinterpreted. In Onchocerca cases with eye symptoms, the author does not consider that the facts so far available justify the conclusion that improvement of vision is directly associated with excision of the nodules, although that they were in some way connected seemed clear. In his experience the majority of nodule carriers were healthy people, and he could not connect the filarial nodules with the disease "erysepelas de la costa."

R. T. L.

Faust (Ernest Carroll). *Thelazia* **Infection of Man and Mammals in China.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Jan. Vol. 20. Nos. 5 & 6. pp. 365–369. With 2 plates. [12 refs.]

Faust has examined specimens of Thelazia from man and from dog and agrees with Leiper's conclusion that all belong to the same species —*T. callipaeda*. The male is described for the first time and the rabbit is recorded as an additional host. *T. rhodesi* is recorded from the cow in China.

T. W. M. C.

Yamaguchi (Sachyu). Ueber die durch Larven von *Ascaris lumbricoides* und *Strongyloides stercoralis* in Gehirn und Nieren verursachten Veränderungen. [**Changes in Brain and Kidney caused by Larvae of *A. lumbricoides* and *S. stercoralis*.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Oct. 15. Vol. 29. No. 10. pp. 589–604. With 1 text fig. & 7 figs. on 1 plate. [11 refs.]

Haemorrhages into the renal tubules may be caused by larvae boring out of the capillaries of the cortex, or from the arterial rete mirabile of the glomerulus, in which case blood flows into the upper part of the coiled tubules. In only a small percentage of animals infected by feeding with ripe eggs of Ascaris could blood be traced to the latter origin. But when infective larvae of *Strongyloides stercoralis* were injected into the carotid artery near the heart, and the kidney removed immediately after the first appearance of bleeding, the percentage was considerable, while it was less if removal was done an hour afterwards. This was probably because the blood was quickly pushed out into the tubules under the normal pressure of the glomerulus. Bleeding into the tubules was found to be most extensive in the superficial layers of cortex and in the region supplied by the end branches of the arteriae interlobulares.

The haemorrhages caused by the larvae in the capillaries of the brain substance itself were found to be very slight indeed, even in heavy infections, but might be fairly extensive in the meninges and perivascular lymph spaces. This is probably due to the fact that it is easier to bleed into spongy tissue or liquid filled spaces than into firmer tissue, such as the brain substance.

In both brain and kidney the author found the ecdysed sheaths of the larvae.

R. T. L.

Alcaraz (Ramón A.). La evolución del áscaris lumbricoides en los animales de laboratorio. [**Development of** *A. lumbricoides* **in Laboratory Animals.**]—*Semana Méd.* 1926. Dec. 16. Vol. 33. No. 50 (1718). pp. 1632–1634. With 1 text fig.

After a review of modern conceptions of the life-history of Ascaris, the author draws attention to the observation by Lutz in 1888 in Brazil, of what were then considered to be accidental pulmonary lesions in a patient suffering from ascaris infection. The author has experimentally infected guineapigs with human ascaris eggs and produced a typical pneumonia in 6–8 days after infection.

T. W. M. C.

Caldwell (Fred C.) & Caldwell (Elfreda L.). **Are** *Ascaris lumbricoides* **and** *Ascaris suilla* **Identical?**—*Jl. Parasit.* 1926. Dec. Vol. 13. No. 2. pp. 141–145. [8 refs.]

The authors find in Alabama that, although ascaris infection in pigs amounts to 45 per cent. and conditions are favourable for human infection from this source, infection in man is only 1 per cent. They conclude that this epidemiological evidence supports the theory of non-identity of the two forms.

T. W. M. C.

Muzii (Mario). Diagnosi radiologica dell' ascaridiosi. [**Diagnosis by Radiology of Ascariasis.**]—*Policlinico.* Sez. Prat. 1927. Jan. 17. Vol. 34. No. 3. pp. 83–85. With 3 text figs.

Muzii records three cases of ascariasis which were diagnosed by means of X-rays after a barium meal. Three skiagraphs are given. [The method does not appear to be superior to the more usual technique of examining the stool for the presence of ova.]

T. W. M. C.

Scharpff (W.) & Schneller. Die Askaridenkur mit Oleum Chenopodii bei Erwachsenen. [**Cure of Ascariasis in Adults by Oil of Chenopodium.**]—*Muench. Med. Woch.* 1926. Apr. 23. Vol. 73. No. 17. pp. 693–695. [14 refs.]

Regular results were obtained by a two days' cure only, with three administrations of oil of chenopodium each day. The dose used was 10, 12, or 16 drops, according to the age, sex, weight and general condition of the patient. The best precautions against risk of poisoning were : Conduction of the cure on two successive days, thorough clearing of the gut before treatment and each evening of the cure, suitable dosage of the medium and stoppage of the drug in all cases of fever, chronic disease and weakness. The above method has been in use in the Tübingen Clinic for over two years. No cases of poisoning have occurred.

R. T. L.

Rico (J. Toscano). Sur les propriétés anti-helminthiques de l'*Allium sativum*. [**Anthelmintic Properties of** *Allium sativum*.] *C.R. Soc. Biol.* 1926. Dec. 31. Vol. 95. No. 38. pp. 1597–1599. With 2 text figs. [6 refs.]

— —. L'action des crésols sur l'*Ascaris lumbricoides*. **Action of Cresols on** *A. lumbricoides*.]—*Ibid.* With 4 text figs. [8 refs.]

Rico has tested the action of *Allium sativum* on ascaris *in vitro* and finds that it produces a complete paralysis of the muscles. The anthelmintic

action of the drug is due to sulphate of " allyle." Similarly he has tested ortho- meta- and para-cresol and finds the latter the most active.

T. W. M. C.

Valerio (Americo). A proposito de uma observação de meningite ascaridiana. **A Case of Ascaridial Meningitis.**]—*Brazil-Medico.* 1926. June 12. Year 40. Vol. 1. No. 24. pp. 309–310.

A case of meningitis in a child who vomited Ascarids is described. His faeces contained ova of Taenia, Whipworms and Ascarids. Many Ascaris worms were passed after anthelmintic treatment, and the author discusses the possibility of a toxin being responsible for the nervous symptoms. He believes that this was a case of " verminous meningitis."

Jona (Augusto). Meningite tubercolare ed ascaridiosi. [**Tuberculous Meningitis and Ascariasis.**]—*Riforma Med.* 1926. Feb. 22. Vol. 42. No. 8. pp. 172–174. [12 refs.]

This is a note of four cases of tubercular meningitis in which Ascaris were simultaneously found. The author points out that these worms are often expelled during a febrile attack and he discusses the nervous symptoms produced by them. The possibility of a verminous toxaemia facilitating the action of the tubercle bacilli is suggested.

R. T. L.

Capecchi (Egisto). Pseudo-peritonite cronica da ascaridi. [**Chronic Pseudo-Peritonitis due to Ascarides.**]—*Riforma Med.* 1926. June 28. Vol. 42. No. 26. pp. 619–620.

This is a case of a girl of 15 with symptoms of chronic peritonitis in whom an exploratory laparotomy showed the perforation of the intestine with numerous Ascarids.

T. W. M. C.

Row (Y. S.). **A Case of Ascaris Infection simulating Cholera.**—*Indian Med. Gaz.* 1927. Feb. Vol. 62. No. 2. p. 87.

As the patient showed symptoms resembling cholera two pints of hypertonic salt solution with glucose and adrenalin were administered intravenously. The symptoms subsided but Ascaris infection was diagnosed. Since treatment with santonin and the expulsion of 164 worms, the symptoms have not recurred.

R. T. L.

Ikuji (Ken). [**Statistics of Ascariasis among Children and on the Influence of Ascariasis on the Nourishment of the Children.**]—*Jikwa Zasshi* (*Jl. of Pediatrics*). 1926. Feb. No. 309. [Summarized in *Japan Med. World.* 1926. Dec. 15. Vol. 6. No. 12. p. 360.]

The author records the presence of *Ascaris* and *Trichocephalus* in suckling babes.

T. W. M. C.

Murray (H. E.). [*Ascaris lumbricoides* **in Fallopian Tube.**]—*Jl. Obstetrics & Gynaecology of British Empire.* Manchester. 1926. Autumn. Vol. 33. p. 448. [Summarized in *Jl. Amer. Med. Assoc.* 1926. Dec. 18. Vol. 87. No. 25. pp. 2128–2129.]

Murray records the occurrence of Ascaris in the fallopian tube.

Carsten (Max). *Ascaris lumbricoides* in der Blase. [*A. lumbricoides* **in the Bladder.**]—*Deut. Med. Woch.* 1927. Mar. 4. Vol. 53. No. 10. p. 411.

Carsten records a case of infection of the bladder by *Ascaris lumbricoides*, eggs being found in the urine.

R. T. L.

Koch (Ernst Walther). Oxyurenfortpflanzung im Darm ohne Reinfektion und Magenpassage. [**Multiplication of Oxyuris in the Bowel without Reinfection or Passage through the Stomach.**]—*Cent. f. Bakt.* 1. Abt. Orig. 1925. Feb. 18. Vol. 94. No. 3-4. pp. 208–236. With 6 text figs. & 1 plate. [9 refs.]

From observations of ten children suffering from Oxyuris infection, it was found that the outward migration of worms occurred in the early hours of sleep and lasted for about three hours, 65 being the largest number of worms observed in this period. Egg-laying occurred almost immediately and was complete in 15-20 minutes, the time taken depending on the moisture present. In two hours as many as 16 out of 43 worms were seen to penetrate to the female genitalia. In no case was a worm observed to wander back into the bowel. It appeared that the outward wandering of the pregnant females was a purely passive action brought about mechanically by the extension of the uterus into the head end, thus flattening the sucking pharynx and causing the animal to lose its hold on the mucous membrane. This explained the disproportion of males and females outside the body, for in the male the testes did not extend anteriorly. Immature forms which possessed neither lip membrane nor sucking pharynx were liable to be passed out with the faeces. Experiments showed that oxygen was not essential either for egg-laying or for development of the egg.

That Oxyurids may develop in the gut without reinfection and without passage through the stomach was shown by the author, who succeeded in infecting a child by injecting adult females into the body by means of an enema. Elaborate precautions were taken to prevent reinfection by the mouth, and it was found that the worms actually multiplied in the intestine.

R. T. L.

Schröpl (Ernst). Hautproben mit Oxyurenextrakt. [**Skin Tests with Oxyuris Extract.**]—*Deut. Med. Woch.* 1926. Sept. 3. Vol. 52. No. 36. p. 1508.

Using alcohol extracts of fresh Oxyuris, Schröpl injected 35 patients and finds that not only is there a local reaction, but a state of change in the whole body results. He believes that the parasite secretes a toxin and that the frequency of the parasite, especially in older children, and its connexion with various still obscure common complaints, should be investigated.

R. T. L.

Silianski (L.). Zur Behandlung der Oxyuriasis. [**Treatment of Oxyuriasis.**]—*Deut. Med. Woch.* 1926. Feb. 26. Vol. 52. No. 9. p. 366.

Powdering with Vasolenoform powder was found to sooth the irritation in oxyuriasis and to prevent development of eggs by depriving

them of moisture. This treatment cured the author himself of the infection and was successful in two of three children treated by Dr. Lubinski. It has yet to be proved whether treatment with Vasolenoform alone suffices in severe intestinal cases, and whether the action of the formaldehyde in the Vasolenoform is specific for the worm eggs.

R. T. L.

Karpeles (F.) & Blum (K.). Zur Klinik der Trichinoseerkrankungen. [**Symptomatology of Trichinosis.**]—*Med. Klin.* 1926. Aug. 20. Vol. 22. No. 34 (1132). pp. 1289–1293. [4 refs.]

The authors record in detail the symptoms and blood pictures of five Trichina patients and discuss the cases. They conclude that the cardinal symptoms of trichinosis are muscle pains, trismus, fever, and the appearance of the diazo reaction whereas the eosinophilia is unreliable. Mortality is about 33 per cent. The favourable course in children is unexpected; they never die from the disease. Prognosis is grave; diagnosis can only be certain if a piece of excised muscle is examined microscopically. Treatment is symptomatic and calcium should be given by mouth and intravenously.

R. T. L.

Oudendal (A. J. F.). **About Changes of the Mucous Membrane caused by** *Trichocephalus dispar.*—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1926. Pt. 4. pp. 333–344. With 11 coloured figs.

Christoffersen suggested that the head of Trichocephalus bores into the intestine and thus forms tunnels. Oudendal cannot accept this suggestion and believes that the long neck fixes itself by "rolling" in the superficial epithelium. It is never found deeper than the mucous layer. The neck becomes surrounded by a giant cell, which comes to line the tunnel and probably originates from the mucosa itself. The parasite often enters a glandular duct and by twisting on itself becomes surrounded by the intertwined epithelial cells in which eosinophil cells congregate. The article is accompanied by a number of excellent coloured plates of sections of the parasite in situ.

T. W. M. C.

German (S. G.). **Cases of** *Trichostrongylus instabilis* **in the City of Saratov.**—*Rev. Microbiol. et Epidémiol.* 1926. Vol. 5. No. 4. English summary p. 335. [In Russian pp. 285–289. 16 refs.]

Out of 2,269 persons examined in Saratov, *Trichostrongylus instabilis* was found in 16, mostly school children.

T. W. M. C.

Stiles (Charles Wardell). **Light Hookworm Infection: should Patients be "advised that they are Carriers but do not need Treatment"?**—*Jl. Amer. Med. Assoc.* 1927. Feb. 12. Vol. 88. No. 7. pp. 455–456. [2 refs.]

Recently hookworm investigations have become more and more mathematical and attempts have been made to estimate the number

of adult worms harboured on the basis of an egg count. Smillie and Augustine have recently attempted to classify infected persons (irrespective of clinical symptoms) as carriers (under 100 worms) and as patients (over 100 worms). Carriers are to be advised that treatment is unnecessary. Stiles holds that since infections produce both objective symptoms (which are measurable) and subjective symptoms (which are not), an estimated number of worms is not a safe criterion. He believes that these researches are being pushed to an illogical extreme.

R. T. L.

Castillo Odena (Isidro). Anquilostomiasis. [**Ancylostomiasis.**]—*Semana Méd.* 1927. Feb. 10. Vol. 34. No. 6 (1726). pp. 356–366.

Hookworm disease is serious in the province of Corrientes, 90 per cent. of the inhabitants being infected in parts. Treatment was by means of a mixture of carbon tetrachloride (2 parts) and oil of chenopodium (1 part), 2·4 cc. per adult being given simultaneously with magnesium sulphate. Complementary measures were construction of latrines, education and propaganda, including a sanitary campaign. Other parasites found were Ascaris, Oxyuris, whipworm and Taenia.

T. W. M. C.

Soper (Fred L.). **The Report of a Nearly Pure** *Ancylostoma duodenale* **Infestation in Native South American Indians and a Discussion of its Ethnological Significance.**—*Amer. Jl. Hyg.* 1927. Mar. Vol. 7. No. 3. pp. 174–84. [24 refs.]

Soper has examined 70 natives of the Chaco in Paraguay and finds that they shew an *Ancylostoma* : *Necator* ratio of 13 : 1. As both species were originally imported to America from the Old World, he deduces from this that, either the *Necator* element of an originally mixed infection has died out under circumstances favourable for the *Ancylostoma* element, or that the *Ancylostoma* infection antedates the *Necator*. He believes that the latter is the case and that, while *Ancylostoma* was present before the Spanish conquest, *Necator* is of very recent introduction. He concludes that the "Amerind" race originated in Asia or Indonesia, north of latitude 20°N. and probably reached America via the Pacific.

T. W. M. C.

Schüffner (W.). Zahlenmässige Unterschiede bei Nekator und Anchylostoma. [**Statistical Differentiation of Necator and Ancylostoma.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Sept. 13. Vol. 30. No. 9. pp. 534–544. With 1 text fig. [8 refs.]

This is a statistical examination of the varying proportions of Ancylostoma and Necator infecting different races of peoples, of the relative numbers of each sex present, of the relative actions of different drugs (thymol, chenopodium, carbon tetrachloride) on the different species, and of the relative danger from each species.

In Java, Paraguay and certain parts of India, the proportion of Ancylostoma is low compared with Necator; while in China and

Calcutta the proportion is high (about 1 : 2). The number of males is relatively greater in Ancylostoma than in Necator, although in both cases the females predominate. A single pair of Necators weigh about 2 mgm., while a pair of Ancylostomas weigh 4 mgm. ; from this the author deduces that the latter species must be about twice as dangerous as Necator.

T. W. M. C.

HASLAM (J. F. C.). **A Short Hookworm Campaign in the Pomeroon District, British Guiana.** —*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Jan. Vol. 20. Nos. 5 & 6. pp. 354–356.

A mixture of races inhabits the lower reaches of the Pomeroon River and, in 1925, it was decided to conduct a brief but vigorous hookworm campaign in this area. After a preliminary burst of effective publicity, 1,500 containers were distributed and of these 1,200 were returned with specimens. In all 1,373 persons received treatment. Dr. Haslam and a dispenser attended at four different centres in this area and at each received from the assembled people their sample of faeces and to them administered carbon tetrachloride (45 m. for an adult, children *pro rata*) without any special previous preparation and with no consequent injunctions except the avoidance of "alcoholic indiscretion." Examination of the faeces submitted shewed that about 66 per cent. suffered from hookworm, 64 per cent. from Ascaris and 27 per cent. from whipworms. Although no subsequent records were kept, local reports proclaimed the success of the campaign, which occupied the space of six days ; and it is proposed to repeat it every six months and at the same time improve the general sanitary conditions. It is suggested that, apart from the desirability of removing all ascarids, it would be of advantage to add chenopodium to the CCl_4, for the passage of hookworms is often unnoticed while the passage of ascarids makes a great impression, increasing the popularity of such campaigns.

T. W. M. C.

CHANDLER (Asa C.). **The Prevalence and Epidemiology of Hookworm and other Helminthic Infections in India. Part VI. Burma. Part VII. Bihar and Orissa. Part VIII. United Provinces of Agra and Oudh.** —*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 733–744. With 1 map. [2 refs.] ; 745–759. With 1 map. [6 refs.] ; 761–773. With 2 maps. [4 refs.]

Part VI. Burma. Continuing his topographical survey of hookworm infection and other helminthic infections (*ante*, pp. 190-2) Chandler finds that hookworm infections vary a great deal throughout the country. The minimum infection is in the dry centre (Infection Index under 50) while the Shan States, where shoes and sandals are worn, have an index of 100–150. Along the coast the infection is fairly high (1 per cent., 150-250) while in a few places, near Kamayut and Prome it rises to nearly 450, greater than anywhere in Bengal or Assam. In the flooded Delta and coast divisions, the infection is fairly severe among Indians who do not use latrines, but these are in fairly general use there, although nowhere else in the country. The climate on the whole is suitable for hookworm infections, the rainy

season lasting from May to October, while the delta and the coast become flooded and so lengthen the hookworm season to eight months. The temperature is never extreme. JOLLY has examined jails in Burma and finds that 5·6 per cent. of the hookworms are *A. duodenale*, 2·5 per cent. *A. braziliense* and the remainder Necator. Whipworm and Ascaris infections are common, but they are less so in the north and are rare in the centre. Strongyloides and (?) Gnathostoma also occur. Trematodes are absent. *H. nana* is found in 1 to 3 per cent., while *Taenia* spp. is common in the Shan States but nowhere else.

Part VII. Bihar and Orissa. Hookworm is widespread throughout this area, but the degree of infection is light. Accordingly the Infection Index never exceeds 225 in South Bihar and North Orissa and in general varies from 100 to 150; it is low in the strip next the sea. Latrines are rare and soil pollution general all round the villages. Climatic conditions are favourable for under five months of the year and this helps to keep the degree of infection low. Ascaris and whipworms are fairly common. Strongyloides, (?) Gnathostoma, *H. nana* and *H. diminuta* are also found, while two cases of Fasciolopsis infestation were seen.

Part VIII. Agra and Oudh. Hookworm is prevalent throughout this area except in the south, where it is negligible. In the north-west, where the rainfall is low and the rainy season short, the infection index is about 100. Elsewhere, it gradually increases from 120 in the south-west to 250 in the north-east, where the rainfall is heavy, the atmosphere humid, soil favourable, and the drainage slight. Soil pollution is general except in certain regions at Terai. Shoes are worn in the south and south-west, contributing to the low infection index—elsewhere, they are only worn on special occasions. The rainfall is less than in some areas of Burma, but the infection is higher owing to it being more concentrated. Owing to carefully constructed wells, Ascaris is rare except in Gorakhpur district. Whipworm is nowhere common. Trichocephalus was found on three occasions, while *H. nana* is found in over 4 per cent. of the population. Taenia occasionally occurs in the lower castes.

T. W. M. C.

RICKARD (E. R.) & KERR (J. Austin). **The Incidence and Intensity of Hookworm Infestation in the Various Soil Provinces of Tennessee.** – *Jl. Preventive Med.* 1926. Nov. Vol. 1. No. 2. pp. 185–203. With 7 charts in text. [11 refs.]

An examination of white rural school children in Tennessee shows that only on the Cumberland Plateau and the Unaka mountains is the hookworm problem severe and of major importance, although it is not so severe as in the Mississippi gulf States.

The climate and general sanitation is everywhere favourable but the soil is mostly unfavourable, cultures showing that sandy soil is favourable for the growth of the larvae but clay and silt are not. Ascaris and whipworms are common in the same regions as hookworms. On the other hand Enterobius and *H. nana* are found in up to 5 and 10 per cent. respectively of the population but bear no relationship in their distribution to hookworm.

T. W. M. C.

Blajin (A. N.). Die kopfallgemeine Untersuchung der Schüler in der Schule Namens "Nestor Lakoba" in Sukhum auf die Würmertraegerei. [**Examination of Scholars of Sukhum for Worm Carriers.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 1. German summary p. 70. [In Russian pp. 18–23.]

The author examined the faeces of 145 pupils of a native (Abkhazian) school at Sukhum (W. Caucasus). The samples were examined in smears and by Fülleborn's method. Ankylostome eggs were found in 70-75 per cent. of cases. These are referred to as "carriers," since they showed no clinical symptoms. The amount of haemoglobin was diminished, varying from a minimum of 69 to a maximum of 97 per cent. The number of red corpuscles was more or less normal. There was slight leucopenia, lymphocytosis and eosinophilia (on an average 8·4; maximum 17). In most cases positive polychromasia was noted. Treatment was carried out with thymol (4·5 gm. administered per 0·5 every half hour) and oil of chenopodium (3 doses of 16 drops at intervals of two hours). The examination of the faeces after treatment showed that *N. americanus* was predominant, *A. duodenale* having been found on one occasion only.

C. A. Hoare.

Svensson (Ruth M.) & Kessel (John F.). **Morphological Differences between Necator and Ancylostoma Larvae.**—*Jl. Parasit.* 1926. Dec. Vol. 13. No. 2. pp. 146–153. With 1 text fig. & 8 figs. on 1 plate. [8 refs.]

Svensson and Kessel have examined infective larvae of *Ancylostoma duodenale*, *A. caninum*, and *Necator americanus*, stained with haematoxylin and conclude that generic differences exist; viz. in Necator there is an intermediate space between the oesophagus and intestine which is absent in Ancylostoma, and although a "protrusile oral spear" is present in both it is large and stronger in Necator.

[Of this "spear" it is stated that it is easily seen protruded just before death in chloroform water. That it is a "spear" and not merely a buccal tube extruded in the death agony of the parasite has not been proved.]

T. W. M. C.

Fülleborn (F.). Ueber das Verhalten der Hakenwurmlarven bei der Infektion per os. [**Behaviour of Hookworm Larvae in Infection per os.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Oct. 1. Vol. 30. No. 10. pp. 638–653. [14 refs.]

Yokogawa and Oiso have stated (this *Bulletin*, Vol. 23, p. 776) that the larvae of *A. caninum* when *fed* to a dog mature without migrating through the lungs, and that this is the normal condition when larvae are fed to the normal host. Fülleborn states that he is able to confirm this only for *Uncinaria stenocephala* of the dog. He performed tracheotomy, as did the Japanese authors, and in addition isolated a loop of intestine. He found that although the forms in the intestine died before reaching maturity, they developed to a greater extent than did those in the trachea. Lung transmission, even in cutaneous infections, is apparently not an essential part of development and is merely a means for the larvae to reach the intestine.

Fülleborn finds also that infections with Uncinaria disappear in about five months and his experiments suggest they produce an immunity to future infections.

T. W. M. C.

Séno (R.). Ervaringen over Tetrachloorkoolstof als wormafdrijvend middel bij Anchylostomiasis op Billiton. [**Experiences with Carbon Tetrachloride as a Vermifuge in Hookworm Disease in Billiton.**]—*Geneesk. Tijdschr. v. Nederl. Indië.* 1926. Vol. 66. No. 6. pp. 721–736. With 5 charts in text. [17 refs.]

Though hookworm disease is not of such paramount importance in the Chinese labour force of the tin mines of Billiton as it is, say, on many estates on Sumatra's east coast, the author made a point of treating all the carriers who passed through his hospital in order to keep the degree of infestation as low as possible. His results with carbon tetrachloride confirm the many favourable reports on this drug. The number of worms expelled by a single cure was 89·9–91·8 per cent. of the total number present; the percentage of "absolute cures" by a single treatment amounted to 76·5 per cent. Some facts seem to point to a higher power of resistance of the worms in cases of longer standing.

A dosage higher than 3 cc. for adults is not advised, as being useless and dangerous (acute nephritis, and other by-effects). Preliminary fasting and purgation after the cure are recommended. The drug was administered in capsules, which precaution in the author's opinion diminishes the danger of intoxication by way of the respiratory tract. [Unforeseen toxicity of the drug, as already observed in several instances, which constitutes a serious drawback against its application in mass cures, is not taken into the account by the author in his favourable judgment.]

W. J. Bais.

Tuyter (A.). **On Combined Application of Oleum Chenopodii and Carbon Tetrachlorid in Cases of Anchylostomiasis.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1926. Pt. 4. pp. 373–376. [2 refs.]

The combined drugs removed 96 per cent. of the hookworms and 55 per cent. of the ascarids present in 36 patients. From ·5 to 1 cc. of Chenopodium and 1 to 2 cc. of carbon tetrachloride was given, according to the age of the patients, which was in the late teens.

R. T. L.

Kehrer (J. K. W.) & Oudendal (A. J. F.). Vergiftiging met tetrachloorkoolstof. [**Poisoning with Carbon Tetrachloride.**]—*Nederl. Tijdschr. v. Geneesk.* 1926. Aug. 14. 70th Year. 2nd Half. No. 7. pp. 746–757. With 4 figs. on 1 plate. [18 refs.]

In the authors' first series of 9,000 cases of hookworm treatment with carbon tetrachloride no fatalities occurred, but in a second series of 6,000 they had five deaths. These patients, who had received 5 cc. of carbon tetrachloride and 1·5 cc. of oil of chenopodium, showed fatty degeneration of the liver with a central lobular necrosis and congestion of the portal system, together with a fatty and albuminoid degeneration of the kidneys with desquamation of the epithelial cells. This selective action of the drug cannot yet be explained.

T. W. M. C.

MACIEL (Heraldo). Guerra á Ancylostomose. [**Hookworm Campaign.**] —*Sciencia Med.* 1925. Oct. 30. Vol. 3. No. 10. pp. 593–596.
——. A lucta contra a opilação.—*Ibid.* 1926. May 31. Vol. 4. No. 5. pp. 252–254.

Maciel considers that in Necatorina (gelatin capsules of pure carbon tetrachloride) we have an ideal drug to combat hookworm disease (Opilação), easy to administer, with a fixed dose, economical, moderate in price, without evaporation and non-toxic. He discusses the necessity for intensive campaigns to eradicate a disease which has very serious consequence in Brazil.

T. W. M. C.

LANE (Clayton). **The Mass Diagnosis of Ankylostome Infestation. Part XV. Criticisms: Scientific, Legalistic and Pontifical.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. 9. Vol. 20. No. 7. pp. 455–477. [8 refs.]

The object of the author's researches on the mass diagnosis of ankylostome infestation has been to compare, by rigorous ovum counting, the methods employed. The result has given a very accurate and in many ways a most suitable procedure, devised by the author himself, called Direct Centrifugal Flotation. Lane's technique has been accepted by CHANDLER and others as the quickest, easiest and most accurate method of diagnosis. Individually exact diagnosis on a mass scale has been the author's unswerving aim over a period of many years, and he now feels that Direct Centrifugal Flotation approaches it. In the present communication the more important of the criticisms made in recent papers by STOLL and HAUSHEER, by SOPER and by HAUSHEER, HERRICK and PEARSE, have been considered, but no scientific basis for these has been discovered. Moreover, the author feels justified in ignoring criticisms which he considers legalistic or of a nature thus [pontifically] defined by DOBELL in 1926 [and possibly suggested if not accepted by earlier scientists] as " any form of authority in matters of science is . . . anathema." His discussion of the various scientific objections is not summarized by the author and cannot be adequately indicated in a review. It may be said, however, that a careful consideration is given to the justification which lead Lane to make some alteration in STOLL's technique in his own comparative investigation. The objections of STOLL and HAUSHEER (1926) to the use of the cylinder as a faeces comminutor are met. Lane considers the cylinder to be the best known faecal disintegrator, and he attributes the failure of D.C.F. in their hands to failure not of the technique but of complete disintegration. In disintegration the value of soakage is stressed but the danger of the use of decinormal caustic soda solution and the fallacy of using an established chitinoid solvent in " crucial " experiments to test the effectiveness of the D.C.F. method is pointed out. The limit of effective concentration and the factors which make for inaccuracy in hanging or flat preparations are dealt with. The result of tests made on Caldwell's technique and that of Stoll, for which accuracy within 10 per cent. of the average of at least two counts made by any suspension has been claimed, shows that these techniques can scarcely be accepted as giving satisfactory results.

R. T. L.

Pantaleoni (Pio). L'anchilostomiasi nella provincia di Forlì. **Ancylostomiasis in the Province of Forli.**] —*Policlinico. Sez. Prat.* 1926. Feb. 22. Vol. 33. No. 8. pp. 264–266. [7 refs.]

Pantaleoni records five cases of hookworm disease in Forlì and draws attention to the clinical and social importance of this parasite.

Makhviladzé (N.) & Dideboulidzé (G.). L'endémie d'ankylostomiase en Géorgie. **Ancylostomiasis in Georgia.**] —*Bull. Soc. Path. Exot.* 1926. Dec. 8. Vol. 19. No. 10. pp. 891–896. [5 refs.]

Hookworm disease is not uncommon in west Georgia, both *A. duodenale* and *N. americanus* being found. No cases have so far been reported from east Georgia, probably owing to climatic conditions being unfavourable.

Lindtrop (H.). Weitere Untersuchungen ueber die endemischen Brutstatten der Ankylostomiasis in Transkaukasien. **Endemic Foci of Ancylostomiasis in Transcaucasia.**] —*Russian Jl. Trop. Med.* 1926. No. 4. German summary p. 77. [In Russian.]

The present work continues the author's research on Hookworm in Transcaucasia. Both Ancylostoma and Necator occur in this area.

Rico (J. Toscano). L'ankylostomiase autochtone au Portugal. [**Autochtonous Ankylostomiasis in Portugal.**]—*C.R. Soc. Biol.* 1926. Nov. 26. Vol. 95. No. 34. p. 1287.

——. Ankylostomiase autochtone au Portugal : *Ankylostoma duodenale* et *Necator americanus*.—*Ibid.* Dec. 31. Vol. 95. No. 38. pp. 1593–1595. [5 refs.]

——. L'ankylostomiase dans quelques mines portugaises.—*Ibid.* pp. 1595–1596.

Previous cases of hookworm in Portugal have been contracted abroad, but Rico has found that *A. duodenale* occurs naturally among miners in the north of the country.

Necator was found in one miner who had apparently brought it from Brazil. The mines are also infected heavily with ascaris and whipworms.

Baldwin (A. H.). **Hookworm and Filariasis in Australia.**—*Health.* Melbourne. 1927. Jan. Vol. 5. No. 1. pp. 5–11.

This is a brief survey of the past and present work in progress in combating these two diseases in Australia.

Juillet (A.) & Espié (A.). Un nouveau foyer d'ankylostomiase dans le Sud Tunisien à Gabès. **New Focus of Ancylostomiasis in S. Tunis.**] —*Arch. Inst. Pasteur de Tunis.* 1926. Dec. Vol. 15. No. 4. pp. 336–340.

From an examination of recruits at Sfax, the author has discovered an endemic focus of hookworm disease at Gabès. An examination of stools from the civil prison there confirmed this.

T. W. M. C.

Manalang (C.). **Critical Tests of Hookworm Remedies on Man.**—*Amer. Jl. Trop. Med.* 1927. Jan. Vol. 7. No. 1. pp. 57–59.

Manalang has examined, post mortem, eight men treated with carbon tetrachloride and five with chenopodium and finds that the former is much superior to the latter.

R. T. L.

Little (J. P.) **A Case of Optic Neuritis, caused presumably by *Ankylostoma duodenale* Infection.**—*Jl. Roy. Army Med. Corps.* 1927. Jan. Vol. 48. No. 1. pp. 61–63.

By a process of elimination, Little concludes that optic neuritis, observed in a man of 23, was due to *Ancylostoma duodenale*. (The presence of the parasites was diagnosed from the ova.)

R. T. L.

Barnes (M. E.) & Russell (Paul F.). **Final Report on the Survey of Hookworm Infection, General Sanitary Conditions and Organized Health Work in the Straits Settlements.** Publication No. 1. Straits Settlements Rural Sanitation Campaign. Singapore. 1925. Dec. 31. 30 pp. With 4 figs.

This is a fuller account of the researches of Barnes and Russell which have been reported from another source (*ante*, 192).

T. W. M. C.

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v. Drigalski (W.) & Koch (E. W.). Ueber die Bedeutung des Wurmfortsatzes für die Entwicklung der Oxyuren. Untersuchungen an 200 Schulkindern. —*Deut. Med. Woch.* 1925. Feb. 20. Vol. 51. No. 8. pp. 309–311.

Kato (Yoshiji). [On the Action of Cholesterin against Ancylostomal Anemia.]—*Aichi Igakkwai Zasshi* (*Jl. Aichi Med. Soc.*). 1926. May. Vol. 33. No. 3. [Summarized in *Japan Med. World.* 1926. Dec. 15. Vol. 6. No. 12. p. 354.]

de Mello (Froilano) & Alvares (Joaquim Mariano). Cercarias parasitas do Indoplanorbis exustus em Gôa.—*Arquivos Indo-Portugueses de Med. e Historia Nat.* Nova-Goa. 1926. Vol. 3. pp. 245–249. [French summary p. 249.]

Nottebaum. Die Behandlung der Oxyuriasis mit Schwefel.—*Deut. Med. Woch.* 1927. Feb. 11. Vol. 53. No. 7. p. 283.

Oba (T.). Clinical Significance of Eosinophilic Leucocytes in Surgical Diseases, especially of Patients with Intestinal Parasites.—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1926. Oct. No. 259. English summary pp. 1–2. [In Japanese.]

Paget (H.). The Determination of Ascaridole in Chenopodium Oil.—*Analyst.* 1926. Vol. 51. pp. 170–176. [*v. Bull. of Hyg.* 1927. Vol. 2. p. 165.]

Plaut (Alfred). Bilharzia Infection in an Apparently Normal Appendix.—*Arch. Path. & Lab. Med.* Chicago. 1927. May. Vol. 1. No. 5. pp. 711–719. With 11 text figs. [4 refs.]

Rattray (M. J.). Pylorospasm due to Helminths. [Memoranda.]—*Brit. Med. Jl.* 1926. Oct. 30. p. 781.

Sambon (L. W.). Refutation of Statements made by Professor R. T. Leiper, M.D., D.Sc., F.R.S., concerning African Schistosomes, "American" Gongylonemas, Zoo Vermin and Italian Cancer Houses.—*Jl. Trop. Med. & Hyg.* 1926. Sept. 15. Vol. 29. No. 18. pp. 314–322.

Scharff (J. W.). Notes on a Case of Infantile Ascariasis.—*Malayan Med. Jl.* 1926. Sept. Vol. 1. No. 3. p. 3.

Tsunashima (Yoshito). Zur Funktion der Schilddrüse bei Ankylostomiasis.—*Okayama-Igakkai-Zasshi* (*Zent. d. Okayama Med. Gesellsch.*). 1926. Dec. No. 443. German summary p. 1376. [In Japanese pp. 1377–1385. 54 refs.]

Uemura (Yoshio). Ueber das Bilirubinspiegel im Blutserum bei Ankylostomiasis —*Okayama-Igakkai-Zasshi* (*Zent. d. Okayama Med. Gesellsch.* 1926. July. No. 438. German summary p. 808. [In Japanese pp. 803–807. 14 refs.]

Yano (Ataru). [Findings of the Kidneys Infected with *Filaria immitis* and Experimental Studies on the Toxicity of the Adult Worm and the Eggs.] —*Saikingaku Zasshi* (*Jl. of Bact.*). 1926. Mar. No. 361. [Summarized in *Japan Med. World.* 1926. Nov. 15. Vol. 6. No. 11. p. 325.]

LEPROSY.

Luis Carrera (José). El problema de la lepra en la Argentina. Orientaciones para su profilaxia. [**The Problem of Leprosy in the Argentine. Suggestions for Prophylaxis.**]—*Prensa Méd. Argentina.* 1926. Dec. 20. Vol. 13. No. 20. pp. 680–689.

This is an interesting contribution to the subject, based largely on the study of cases in the Muñiz hospital. The majority of the lepers there come from Santa Fé, and next in order are Buenos Aires, Entre Rios, Corrientes and the Federal Capital.

Some 10 per cent. of the cases have contracted the disease outside the country. Inspection is not very thorough and probably many cases go unrecognized. The author points out the importance of morale and environment in the treatment of patients—open air, good food, as much freedom as possible, work, recreation, and the hopeful expectancy of cure are all important.

Cases are quoted to show how urgently legal enactments are needed; thus, a man who has been a leper for 8 years, with nodules and ulcers, at present in hospital, now wishes to live with his family, and there is no law to prevent it. Again, a woman with mixed leprosy goes repeatedly to her home, stays there for a time, and returns pregnant; she has had five abortions in the last three years, and now wishes to leave hospital so that she may have the accouchement in her own home.

Early diagnosis being all-important for successful treatment, and many medical men knowing comparatively little about the disease, it is suggested that more attention should be paid to leprosy during the student days, the disease being regarded, not merely as a form of skin trouble to be seen in the Dermatological Department, but as an important infective condition. Vice versâ, mistakes are not very infrequent, such, for example, as syphilis being diagnosed as leprosy, and such non-leprous patients have been found mixing with lepers in hospital.

As a further need for legislation it is stated that the time between the appearance of symptoms and the patient coming to hospital is never less than four years, usually more. In one instance the diagnosis was made when a man was 15 years old, and he came to hospital at the age of 64.

H. Harold Scott.

Baliña (Pedro L.). Sobre la manera de llevar a la práctica la ley nacional anti-leprosa. [**On the Mode of Carrying into Practice the National Leprosy Law.**]—*Prensa Méd. Argentina.* 1926. Dec. 10. Vol. 13. No. 19. pp. 627–632.

This paper was read at a meeting at which the president of the National Health Department was present. It consists of five subsections: (1) A brief review of the incidence of leprosy in the Argentine, showing that 80 per cent. of cases are found among the poorer classes, and 90 per cent. are in the Provinces of Buenos Aires, Santa Fé, Corrientes, Chaco and Formosa. Section (2) deals with the improvement of the provisions of the law. It is suggested that "Provisional" or "Regional Asylums" should be established for colonization by severe and destitute cases in those places where there are the greatest number of lepers, not in the cities themselves, but outside. One

should be erected for Entre Rios and others for Santa Fé and Corrientes. The last two would receive patients from Chaco and Formosa. Section (3) deals with the medical personnel and maintains that all who have to do with the prophylaxis and treatment should be specially trained and qualified by at least a year's study of the disease, and should also have an intimate knowledge of dermatology and syphilis. The two final sections consider the establishment of places for consultation and treatment and the naming of such so as to avoid opposition. To accomplish this, the word " leprosy " is not to be used, but such terms as " The Provisional Asylum of Buenos Aires (Law 11359)," or " Dermato-venereal Dispensary," for example, to give advice on and to treat leprosy, syphilis and other venereal diseases, and affections of the skin.

H. Harold Scott.

Pupo (Aguiar). O problema da lepra no Brasil. [**Leprosy in Brazil.**]—*Sciencia Med.* 1926. Dec. 31. Vol. 4. No. 12. pp. 663–692.

Leprosy was probably imported into Brazil with the negros in 1580, or introduced by the Portuguese from Madeira in 1600. It was certainly not indigenous, for Pison in 1637 reported (as did others before and after him) that " leprosy and scabies are unknown " amongst the natives of Brazil.

Statistics published in 1887 showed that in the previous year there were 363 cases in S. Paulo, and with the increase of the population the number of cases has grown, the ratio keeping at 1–1·4 per mille. In Minas Geraes, recent statistics by Professor Aleixo give 10,000–12,000 as the number of lepers in the whole State, the population being nearly 6,000,000, or about 2 per mille. In the Northern parts it is but little less , in Pará and Maranhão the incidence is 1·5 per mille, while in Belém, in the State of Pará, amongst a population of 236,420 inhabitants, the index given for 1923 was as high as 5·5 per mille.

It is calculated that there are in all some 27,000 lepers in the country, so that the problem of dealing with them is both a difficult and a pressing one. The only way of doing this without great waste of energy and needless expenditure is Federal control in collaboration with the various States. " Collective isolation " by the establishment of colonies taking 500–1,000 lepers is advised, planned on lines similar to that of Saint Angelo. Lepers should be given as much freedom as is compatible with safety, while prohibiting their travelling from one State to another. The paper is largely statistical and much of the remainder is devoted to citations from reports of what has been done in other countries. Tables are appended giving the returns of census and of lepers for various municipalities in the different States.

H. Harold Scott.

Guerrero (Luis E.). **Topographical Distribution of Leprosy in the Philippines.**—*Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2. pp. 653–686. With 1 chart. [7 refs.]

The distribution of the disease has been worked out from the number of lepers segregated at Culion from each area of the Philippine Islands,

and compared with the climatic and other conditions. The yearly number of lepers collected averaged 9·51 per 100,000 population, and about 8·28 per 1,000 square miles of country; but the distribution was unequal. Historically it is considered that leprosy was carried by the Hindus to the Malay Archipelago, and imported into the Philippines by the primitive Malay settlers or by later immigrants from the same area; and the disease was certainly present before the arrival of the Spaniards. The areas first settled still have the densest population and the largest proportion of lepers, the outstanding correlation being between density of population and high leprosy incidence: and this is in accordance with the generally held view of the communicability of the disease by close contact. On the other hand, no such close relationship to rainfall was found as Rogers showed in the case of India. [The humidity and rainfall of the Philippines do not vary to nearly the same extent as in different parts of India.] A poor diet, lacking in vitamins, exerts a predisposing influence in favour of the disease; but this again does not modify the relationship to density of population.

L. Rogers.

Nazareth (S.), Gracias (E.) & d'Araujo (A.). Lèpre dans l'Inde portugaise. [**Leprosy in Portuguese India.**]—*Bull. Soc. Path. Exot.* 1926. Dec. 8. Vol. 19. No. 10. pp. 928–934.

The statistics showed 100 known lepers, but the true number is estimated at over 200. The importance of allowing uninfective early cases to be treated at dispensaries, as in British India, is recognized, infective cases being segregated on the lines usually recommended. *H. wightiana* preparations are used in the treatment. Two cases were diagnosed by finding lepra bacilli by puncturing glands. Want of funds handicaps the campaign against the disease.

L. R.

Canaan (T.). Die Lepra Palästina. [**Leprosy in Palestine.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Jan. Vol. 31. No. 1. pp. 20–31. [23 refs.]

Since 1896 261 cases of leprosy from 114 places are known to have occurred in Palestine. In a few instances the incubation is said to have been from 11 to 27 years. Most cases arise in childhood or youth; the nodular cases are far more infective than the nerve ones. The authors found no very definite relation between climate and the distribution of the disease in this small country. The Wassermann reaction was usually positive, but the sedimentation of the blood test was not reliable. He tried eparseno and thymol in treatment with negative results; but obtained very satisfactory results by the use of chaulmoogra oil preparations, using a combination of Aiouni orally and ethyl esters in Muir's E.C.C.O. mixture intramuscularly in doses of from 0·10 to 1 cc. Three cases were cured, and in others many nodules disappeared and others became reduced in size; ulcers of the skin and throat healed; sensation was regained; the general health improved much. The bacilli disappeared from the lesions.

L. R.

Yoannovitch (George). La lèpre en Bosnie et Herzégovine. [**Leprosy in Bosnia and Herzegovina.**] —*Bull. Office Internat. d'Hyg. Publique.* 1926. Dec. Vol. 18. No. 12. p. 1404.

In 1898 compulsory notification of lepers was introduced, when 115 cases were known, which increased to 317 by 1904 through the discovery of 203 new cases, making an incidence of 0·186 per mille. Since that time there has been a steady decrease to only 42 in 1924; 25 of these are Musulmans; all are among peasants, and none in the towns.

L. R.

Cook (Cecil). **Leprosy Problems.**—*Med. Jl. Australia.* 1926. Dec. 11. 13th Year. Vol. 2. No. 24. pp. 801–803.

This is an answer to the paper of Molesworth [*ante*, p. 208], in which he advocated doing away with compulsory segregation, on the ground that racial immunity against the disease is a sufficient safeguard to the British community in Australia. Dr. Cook shows that the arguments in favour of this contention are fundamently unsound; for the leprosy rate in parts of Queensland is not less than 1 per mille, and in the Northern Territory six white lepers have been reported in the last few years in a white population of less than one thousand. In New South Wales leprosy is no longer a danger, thanks to the efficiency of segregation measures there, but it continues in Queensland owing to imperfect administration of the measure; so, in view of the success already obtained in parts of Australia, cessation of the effort would be a national calamity. On the contrary, adequately equipped sanatoria, with efficient specialized treatment are required, especially in Queensland; where thorough investigation of the incidence and effective isolation are absolutely necessary.

L. R.

Leger (Marcel). A lepra e sua contagiosidade. [**Contagion of Leprosy.**] —*Rev. Med.- Cirurg. do Brasil.* 1927. Jan. Vol. 35. No. 1. pp. 2–10.

The author reviews the present ideas as to the transmission of leprosy, dealing with hereditary transmission and contagion, under the sub-headings of: (*a*) statistical evidence from records obtained from various countries; (*b*) experimental evidence of transmission or the failure of transmission to laboratory animals; (*c*) epidemiological grounds. He mentions the views which have been put forward to incriminate biting insects and flies, and concludes that infection is almost certainly by direct contact, though the degree of danger is not so great as for tuberculosis, and that prevention is purely a matter of improved hygiene and sequestration.

H. Harold Scott.

Treuherz (Walter). Zur Frage der Leprakontagiosität. [**The Question of Leprosy Contagion.**]—*Dermat. Woch.* 1926. Vol. 83. No. 52a (Ergänzungsheft) pp. 1889–1892.

This paper discusses in a general way the contagiousness of leprosy as seen in Brazil, and emphasizes the exaggerated popular ideas on the great infectiousness of the disease, which is not based on facts. The paper contains no new information.

L. R.

Huizenga (Lee S.). **Notes on Leprosy.**—*China Med. Jl.* 1927. Feb. Vol. 41. No. 2. pp. 153–156. With 2 figs. on 1 plate.

This is a brief study of leprosy cases at Kwangju, with especial reference to eye symptoms; those were found to be nearly all superficial in origin, and mostly due to the lepra bacillus, and they are easily recognized. Stress is laid on contracted pupils, and hesitating movement of the eyes; the other conditions mentioned being well known leprous lesions.

L. R.

Esquier. A propos de deux cas de lèpre. **Two Cases of Leprosy.** *Bull. Soc. française Dermat. et Syph.* 1926. Dec. No. 9. pp. 723–727.

A clinical description of two imported cases seen at Toulon. The writer points out the difficulty of finding lepra bacilli in some cases of the disease.

L. R.

Schreuder (J. J. C.). Een geval van lepra, met groote waarschijnlijkheid in Nederland verkregen. [**A Case of Leprosy, most probably Acquired in Holland.**]—*Nederl. Tijdschr. v. Geneesk.* 1927. Mar. 12. 71st Year. 1st Half. No. 11. pp. 1321–1322. [3 refs.]

The case concerns an old seaman, who has suffered from manifest leprosy at least since 1913. He had previously visited various Atlantic ports of Western Europe and lived for 6 months in the U.S.A.; yet there is no known contact with lepers in his history, except that during ten weeks in 1907, a brother, who contracted leprosy in the East, stayed with him. The unhygienic habits of the patient, who with his bare hands anointed his brother's open wounds during this time and afterwards wore his brother's clothes, may well account for the infection.

Three similar cases of infection with leprosy in Holland are briefly cited from the literature.

W. J. Bais.

Hoffmann (W. H.). Ein mustergültiges Lepraheim in Cuba. [**A Model Leper Home in Cuba.**] *Ztschr. f. d. gesamte Krankenhauswesen.* 1926. Nov. 6. Vol. 22. No. 23. 2 pp. With 4 text figs.

This is a short popular account of the Havana leper institution with 200 inmates, illustrated by pictures of the grounds and wards, but contains no data of value.

L. R.

Pierini (Luis E.). Manifestaciones iniciales de la lepra. [**Early Signs of Leprosy.**]—*Semana Méd.* 1927. Jan. 20. Vol. 34. No. 3 (1723). pp. 167–172.

In these four pages short notes are given of 78 cases of leprosy, from which the following conclusions may be drawn: (1) Leprosy does not, as a rule, begin with a single symptom, but with more than one; (2) the initial lesion has been noticed to be reddish pigmented spots, sometimes anaesthetic in 28 of the patients; oedema, especially of the lower limbs, in 17; indefinite symptoms such as fever, headache, general depression, in 12; pemphigoid ulcerations in 9; nodules in 7; coryza

or epistaxis in 6; pruritus, general or local, in 5; (3) the patient's occupation seems undoubtedly to exercise some influence in this respect; agricultural day-labourers (25 per cent.) showed lesions of the lower limbs; blacksmiths, stokers, mechanics, chauffeurs, comprising 10 per cent. of the cases, showed lesions of the hands and trunk.

H. Harold Scott.

Rodriguez (José). **Results of the Treatment Work at Culion Leper Colony, Philippines.** —*Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo.* 1925. Vol. 2. pp. 699–722. With 2 charts in text. [7 refs.]

This important paper is so belated that it has lost much of its interest, through the publication of later reports from the same leper colony. It deals with the treatment of no less than 2,920 cases, nearly all advanced; and records that 9·1 per cent. had become negative bacteriologically, 22·1 per cent. were markedly improved, 24·8 per cent. moderately improved, 21·8 per cent. slightly improved, 11·2 per cent. stationary, and 10·9 per cent. worse; but these figures do not include the negative cases who had already been paroled or discharged recovered to their homes; and since March, 1922, 531 cases had been declared negative, remarkable results for such an advanced series. Ethyl esters of *Hydnocarpus wightiana* oil gave at least as good results as those from true chaulmoogra oil; and of other oils tried unsaturated ones gave the best results, especially cod-liver oil, but after some three months the cases on it became stationary. A gradual improvement in the results was found in proportion to the amount of the injections; the percentage of improvement increasing progressively from 64·3 per cent. after only 200 cc., up to 93·9 per cent. after 800 to 1,000 cc. had been administered. Further, a tabulation of the results by six-month periods showed a steady rise in the improvement percentage with each additional six months treatment up to 30 months; and the nerve types showed most improvement. The data regarding the duration of the disease in relation to treatment showed improvement in 87·8 per cent. with a duration of only five years, only 68·9 in those of 5–10 years duration, 70·6 in the next five years, and the rate then rose to 79·7 per cent. in the 15–20 year group and to 88·8 per cent. in the small 20–25 year series. The author agrees with Muir that the importance of proper diet and sufficient exercise cannot be exaggerated in the treatment of leprosy, and general tonics are of value. Diathermy relieved painful neuralgias. Lepra fever was met with in 23·6 per cent. of the treated cases, and only 50·5 per cent. improved during that period, and 18·9 per cent. became worse, against 50·2 per cent. improved and 10·1 per cent. worse in those with no febrile reaction. The mortality was 9·9 to 8·5 per cent. yearly, and there was no doubt the treatment prolongs the life of lepers. Calcium chloride in a 2 per cent. solution intravenously, in doses of 20–30 cc. daily for a week, was found of value in the fever, as advised by Mitsuda, and 2 to 3 grams of bicarbonate of soda orally four or five times a day, or 20 to 25 cc. of a saturated solution intravenously daily for several days were used for the same purpose. Taking into consideration the unfavourable type of cases and other handicaps, and the facts that 481 negative cases have been obtained, while 78 per cent. of those treated throughout the test show improvement, the writer concludes that "it is felt that the results so far are gratifying."

L. R.

Nicolas (Catalino) & Delgado (Luis B.). **The Alkaline Treatment of "Lepra Reaction."**—*Jl. Philippine Islands Med. Assoc.* 1926. Nov. Vol. 6. No. 11. pp. 373–380. [7 refs.]

This paper deals further with the alkaline treatment of the lepra reaction fever mentioned in Rodriguez's paper above, and it is based on the assumption that hypoalkalinity of the blood is a factor in its causation. The doses mentioned above of sodium bicarbonate are given, sometimes together with antipyrin or phenacetin; and it was noted that increased secretion of urine and lessening of oedema, when present, followed the treatment; and that iritis and iridocyclitis improved to a surprising degree after the intravenous alkaline injections. The improvement following the treatment strengthens the authors' belief in the presence of acidosis in these cases, although he had not proved it to occur.

L. R.

Shiga (K.). **Result of Treatment of Leprosy in Chosen, and View on the Isolation Problem of Lepers.**—*Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2. pp. 691–695.

The work reported in this paper was carried out in the hospital on the Korea Peninsula, with injections of chaulmoogra ethyl esters during four years in about 300 cases; of these 39 have been discharged apparently cured and bacteriologically negative, and a number have shown remarkable improvement. In the majority of the nodular cases softening and atrophy of the tubercles was obtained, and also remarkable relief of the pains and anaesthesia. The lepra bacilli became granular, decreased in numbers and finally disappeared. Although the treatment is not yet ideal, it has already greatly simplified the segregation problem, for the patients are now anxious to remain for treatment, and the discharge of patients no longer infective has encouraged voluntary admissions for treatment. This will lead to more effective eradication of leprosy than life-long isolation.

L. R.

Nägelsbach (E.). Ambulante Leprabehandlung. [**Dispensary Treatment of Leprosy.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Oct. 1. Vol. 30. No. 10. pp. 656–659. [4 refs.]

Experience in the treatment of lepers as out-patients in Abyssinia is recorded, and the difficulty in getting them to attend sufficiently regularly and long enough for good results is pointed out. Antileprol was used, and after some months treatment a pause of one or two months was found to be advantageous, from 25 to 40 injections being given in a year. One-third of the cases were nodular and two-thirds nerve forms, and the duration 4 to 10 years. The number of lepra bacilli diminished in the nasal secretion, and clinical improvement resulted from the treatment, which has now been carried on for eighteen months but no cures as yet. Only the chaulmoogra oil preparations have produced any benefit.

L. R.

Luis Carrera (José). Dos años de experiencia en el tratamiento de la lepra. [**Two Years' Experience in the Treatment of Leprosy.**]— *Prensa Méd. Argentina.* 1927. Jan. 30. Feb. 10 & Mar. 10. Vol. 13. Nos. 24, 25 & 28. pp. 802–809 ; 839–848 ; 954–962.

The author has tried various methods of treating his cases of leprosy, though in small numbers, and here records the results.

Two patients were treated by intramuscular injections of cod-liver oil. The first, a woman of 20 years, was given 33 injections, each of 20 cc., in the course of a year. At the end of two months the ulcers healed, leaving areas which were for a long time anaesthetic. No other treatment was employed and the improvement was marked. The second, a woman of 33 years, a more advanced case, had in all 35 injections, but without any resulting amelioration.

To a third patient, a girl of 18 years, with nodular leprosy, were given injections of Heiser's remedy (resorcin, oils of camphor and chaulmoogra), 26 injections in 11 months, but without improvement. The next was treated by Hasson's vaccine, after 35 injections of Heiser's resorcin-chaulmoogra. This was a case of mixed leprosy and the facial nodules disappeared, leaving the skin apparently normal ; the anaesthesia also cleared up ; the improvement is stated to have taken place " in a very short period." Another patient, a woman of 24 years, who had the disease—the " maculo-anaesthetic form with a few tubercles "—for six years, was given 20 injections of 0·75 cc. of the vaccine intramuscularly and 20 of 0·25 cc. intravenously during three months, and the improvement again was " rapid and surprising." This method is worthy of further trial.

The sixth patient was a case of severe mixed leprosy and was treated by 57 injections of Antilebrina Valenti Rivolta. The facial nodules disappeared, leaving merely a dark staining ; the anaesthesia of the face and limbs also cleared up. This case was, unfortunately, not followed up.

Ten patients of the nodular and mixed types were treated by the ethyl esters of chaulmoogra injected intramuscularly. The results may be summed up by saying that in all cases improvement was marked and in one instance a cure has apparently resulted, there being no residual indications either clinically or bacterially.

In the third part are related nine cases treated with the ethyl esters injected intravenously after a short course of intramuscular injections, with excellent results. In two of these the condition seems to have cleared up entirely, and there has been no recurrence, though one has been under observation for several months since ceasing treatment. Injections were administered every four days for a year ; at first 9 were given intramuscularly, totalling 160 cc., the final doses being 20 cc. each. The patient then received 58 intravenous injections, the highest being 12 cc. and the total 364 cc. These doses were well tolerated.

Finally, five patients were given the ethyl esters, intramuscularly and intravenously at the same time, with very good effect, but not better than those already recorded with the single route.

H. Harold Scott.

Jouenne (P.) & Guillet (R.). Deux cas d'améliorations de lèpre après traitement par le B.C.G. [**Two Cases of Leprosy in which Improvement followed B.C.G. Treatment.**]— *Bull. Soc. Path. Exot.* 1927. Jan. 12. Vol. 20. No. 1. pp. 91–92. [1 ref.]

The authors report two cases of improvement after the injection of B.C.G. in doses of 0·02 gm. of the bacillus of Calmette & Guerin, producing abscesses with little pain, from which the bacillus was recovered. In the first case the appearance of the patient improved,

the macules cleared and some sensation was regained ; and the second case showed very similar improvement. All the injections were followed by abscesses.

L. R.

Aoki (T.). **Early Diagnosis and Modern Treatment of Leprosy.** *Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1927. Jan. No. 262. English summary p. 4. [In Japanese.]

In the early diagnosis the author thinks the iodine reaction is of great value, since leprosy patients are very sensitive to the drug. He relies in treatment mainly on *H. wightiana* oil, cod-liver oil and thymol injected subcutaneously in the diseased parts every few days.

L. R.

Scanlon (R. W.). **Leprosy Cases treated in 1925 in Somaliland.** —*Somaliland Protectorate Ann. Med. & San. Rep. for the Year ending 31st December, 1925.* pp. 33–35.

Six cases of leprosy treated by E.C.C.O. mixture of Muir containing ethyl esters of *H. wightiana* with improvement are reported.

L. R.

Impey (S. P.). **Leprosy : its Transmission and Treatment** [Correspondence.]—*Brit. Med. Jl.* 1927. Feb. 26. p. 401.

This letter supports the view that chaulmoogra oil preparations are not of much use in the treatment of leprosy, and is apparently based on trials of its oral administration in South Africa thirty years ago, when it was found of use only in very early cases. The writer suggests linear incision of thickened nerves. [This plan has already been used with some success by E. Muir in Calcutta.]

L. R.

de Mello (F.) & Cabral (J.). Résultats d'injections d'éparséno sur deux malades de lèpre mixte. **Result of Injections of Eparseno in Two Cases of Mixed Leprosy.**]—*Bull. Soc. Path. Exot.* 1926. Nov. 10. Vol. 19. No. 9. pp. 779–780.

The treatment resulted in the death of one patient, and the aggravation of the symptoms in the other ; so the authors reject it as a remedy for leprosy.

L. R.

McIlhenny (Paul A.). **Orthopedic Problems in Leprosy.** —*Jl. Amer. Med. Assoc.* 1926. Dec. 4. Vol. 87. No. 23. pp. 1888–1891. With 5 text figs.

This interesting work was carried out in the National Leprosarium at Carville, Louisiana, at the suggestion of O. E. Denney, to improve the utility of the deformed or weakened hands of nerve forms of leprosy. The author noted reduction of the surface temperature of the anaesthetic parts, as compared with adjoining areas. The treatment adopted included whirlpool baths, massage, active and passive exercises on pendulum machines of the Zander type, faradic and galvanic current, radiant or deep therapy light, ultraviolet rays, and in a few cases

diathermy for the relief of nerve pains. Marked improvement has been noted in some, and considerable in many who took the treatment regularly; several patients have been completely relieved of their deformities and discharged from the department. Artificial limbs have been supplied to a number of patients, who had lost limbs by amputation. [This line of treatment appears worthy of further attention by leprologists.]

L. R.

MARTINS (Thales). L'action physiologique des éthers éthyliques des acides gras de l'huile du *Carpotroche brasiliensis*. [**Physiological Action of Ethyl Esters of the Fatty Acids of** *C. brasiliensis* **Oil**]—*C.R. Soc. Biol.* 1927. Feb. 25. Vol. 96. No. 7. pp. 474–475. [1 ref.]

This paper deals with the action of the ethyl esters of the Brazil chaulmoogric acid containing oil on the heart and the muscles of frogs, with the production of slowing and diminished tone of the heart and of the muscles: the action being similar to that of preparations of chaulmoogra oil.

L. R.

FRANCHINI (G.) & CENDALI (G.). Riproduzione sperimentale della lepra nella scimmia e nel ratto bianco. [**Experimental Leprosy in the Monkey and the White Rat.**]—*Arch. Ital. Sci. Med. Colon.* Tripoli. 1927. Jan. Vol. 8. No. 1. pp. 3–6. With 2 coloured plates. [1 ref.]

The authors inoculated the juice from a human leproma rich in bacilli into the peritoneum of guineapigs, white rats and white mice. A month later an emulsion of a nodule from another patient was injected into the same animals and also in the right superciliary region and the left thigh of a monkey (*Macacus sinicus*). Two of the mice died in a week and a guineapig in a month; post-mortem findings were negative. In the monkey, a few days later, a swelling appeared over the right eye, hard, bluish-red in colour, increasing in a fortnight to the size of a grain of maize; this now decreased and had disappeared 45 days after inoculation. In another 45 days there was noticed a diffuse reddening of the right upper lid, at the edge of which was a small, reddish-blue swelling as large as a millet seed; it increased to the size of a chickpea and was fairly firm but moveable on the underlying tissues. A similar nodule developed just above the point of inoculation in the thigh. This was incised, under anaesthesia, and in smears from scrapings from the depths and from the blood-stained fluid abundant acid-fast bacilli were seen, isolated and in groups. Three weeks later the nodule began to diminish; at no time was there any fever or other sign of constitutional disturbance, and at the time of writing, five months after inoculation, the animal appeared to be in perfect health.

The white rats, twice inoculated, revealed no local symptoms, but after 3 months lost weight. One was killed but nothing was found except *Cysticercus fasciolaris* in the liver. In a second, killed two days later, the peritoneum was adherent and showed several nodules, violet in colour, the size of hempseed, and the fluid was of a deep red. Smears from this showed numerous acid-fast bacilli, but those from other organs—liver, lungs, spleen, axillary and inguinal glands—gave negative results.

H. Harold Scott.

Cendali (Guido). Studio sulla lebbra. [**Studies of Leprosy.**]—*Arch. Ital. Sci. Med. Colon.* 1926. Nov.–Dec. Vol. 7. No. 11–12. pp. 240–266. With 2 coloured plates. [38 refs.]

This article is apparently a reprint of a thesis presented by the author for his diploma. Apart from remarks on leprosy generally, there is an account of inoculations carried out by Reenstierna's method, using emulsified nodules rich in bacilli for injection into monkeys, white rats and white mice (see above).

The author relates four cases of leprosy, one the nodular type, two the maculo-anaesthetic, and one mixed, treated with chaulmoogra in the usual way. It is worthy of note that the serum in each case gave at the beginning of treatment a positive Wassermann reaction.

H. Harold Scott.

Roffo (A. H.). [**Transmission of Leprosy to the Lower Monkey.**]—*Rev. Méd. Latino-Americana.* Buenos Aires. 1926. Nov. Vol. 12. p. 181. [Summarized in *Jl. Amer. Med. Assoc.* 1927. Mar. 19. Vol. 88. No. 12. p. 967.]

Leprous material was inoculated into 22 American and African monkeys, and three developed granular tissue, histologically and bacteriologically similar to human lepromas. The incubation period was from 80 to 85 days, and after 60 days the lesions usually tended to retrogress; so the induced infection is purely local and self-limited and never assumes the generalized progressive form of human leprosy.

L. R.

Cabral (Joaquim). Sobre a possibilidade da transmissão da lepra pelos insectos. [**Transmission of Leprosy by Insects.**]—*Arquivos Indo-Portugueses de Med. e Historia Nat.* Nova-Goa. 1926. Vol. 3. pp. 100–105. [2 refs.] [French summary pp. 105–106.]

de Mello (F.) & Cabral (J.). Les insectes sont-ils susceptibles de transmettre la lèpre?—*Bull. Soc. Path. Exot.* 1926. Nov. 10. Vol. 19. No. 9. pp. 774–777.

After references to published papers, a few experiments by feeding insects on lepromata, and examining them subsequently for acid-fast bacilli, are given; they showed a tendency for the bacilli to decrease in the intestinal canal of bugs and flies, and to disappear after some days. The conclusion is come to that the facts do not indicate any active rôle in the transmission of leprosy by insects. This is in accordance with previous work.

L. R.

Araujo (H. C. de Souza). Cultura do bacillo da lepra. [**Cultivation of the Leprosy Bacillus.**]—*Brasil-Medico.* 1927. Mar. 5. Vol. 41. No. 10. pp. 199–200. With 1 text fig.

The author gives an account of Harada's method of growing lepra bacilli by placing a fragment of leproma on a medium partly solid, partly fluid, the leproma resting on the narrowed portion of a constricted culture-tube and just dipping into the fluid beneath. The liquid medium consists of meat 375 gm., water 1,000 cc., peptone 0·5., NaCl 5·0; the other (which is also called "liquid" in the formula, but not

in the text is made up of mannose 95·0, aluminium "a little," iron "a trace," calcium "a moderate quantity." An abundant growth occurred in 4 weeks at 37° C. The bacilli obtained were strongly acid- and alcohol-fast. Injected into laboratory animals multiplication occurred in various organs and produced lesions identical with those resulting from leprous material. 0·05 cc. of the emulsion of a seven-weeks' culture killed rats in 30 days after being injected intraperitoneally, and 0·5 cc. killed guineapigs in 120 days. Medical men at the leprosarium at Sotojima have confirmed the cultural findings of HARADA.

H. Harold Scott.

CABRAL (Joaquim). Estado actual da sciencia sobre a bacteriologia da lepra, com investigações pessoais sobre as culturas do bacilo de Hansen. [**Bacteriology of Leprosy. Attempt to cultivate the Bacillus.**] *Arquivos Indo-Portugueses de Med. e Historia Nat.* Nova-Goa. 1926. Vol. 3. pp. 107–143. [18 refs.] [French summary p. 143.]

The morphology and distribution of lepra bacilli in the tissues was carefully studied, and attempts to cultivate the organism on a large variety of media were made, with completely negative results. Previous reported successes were due to saprophytes only having been obtained, and not the lepra bacillus. Nothing new was discovered.

L. R.

WADE (H. W.). **Preliminary Notes on Serological Findings in Leprosy, with Special Reference to Certain Non-specific Determinations.**— *Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2. pp. 637–649. [3 refs.]

The writer returns to this subject [see this *Bulletin*, Vol. 23, p. 840], and points out the importance of trying to find some reaction of diagnostic value in the absence of any bacterial test, and the impossibility of cultivating the lepra bacillus; for that purpose non-specific blood reactions are worthy of study.

In the present paper he deals chiefly with the simple formalin coagulation test by the addition of a few drops of strong formalin to 1 cc. of blood serum; in addition to which he has used the simple physical method of Naegeli for determining the refractivity of the whole serum, and its relative viscosity, as given by the Hess viscometer for determining the globulin ratio of the total proteids; which he prefers to call the "globulin value." Over 700 estimations have already been made. The normal figure is about 40, and the maximum in healthy subjects about 50; but in leprosy cases it is higher, and increases with the longer duration of the disease, decreasing in cases that are recovering. Tuberculosis also gives high readings, which complicates the problem owing to the frequency of this complication of leprosy. In children born in the colony the globulin value is normal in a larger proportion of the younger than of the older children, which is significant in relation to the more frequent development of leprosy with increasing age; but treatment with chaulmoogra derivates complicates the matter, since the effect of the drugs on the globulin content has not yet been ascertained. During lepra reactions the globulin value is very high, for only 17 per cent. of 63 cases showed figures below 91, and the others ranged

between that point and 110. The formalin coagulation reaction corresponds in a general way with the globulin values, and is almost always positive in cases with significant increase in globulin. Over 1,000 formalin tests indicate that a yearly test might enable many cases of incipient disease to be detected before the stage of clinical symptoms or of disability; being parallel to the more difficult laboratory globulin value estimations. The simpler test therefore may prove of great clinical value.

L. R.

Paldrock (A.). Zur Muchow-Lewyschen Leprareaktion. [**The Muchow-Lewy Lepra Reaction.** —*Dermat. Woch.* 1926. Sept. 4. Vol. 83. No. 36. pp. 1295–1299.

Lepra nodules are extracted for eight days with a five-fold amount of 96 per cent. alcohol, heated at 56° C. for half an hour on a water bath and filtered, an opalescent fluid being obtained. The serum of the patient is inactivated at 56° C. for half an hour. In 25 well marked nodular cases about half gave positive and half negative reactions, so the test was quite unreliable. The author is doubtful whether it is of any value whatever in the diagnosis of leprosy.

L. R.

Rubino (Miguel C.). Réactions sérologiques dans la lèpre. [**Serological Reactions in Leprosy.** —*C. R. Soc. Biol.* 1927. Jan 28. Vol. 96. No. 3. pp. 225–227.

In this test one cc. of the patient's serum is mixed with 1 cc. of a suspension of sheep's red corpuscles, which have been washed in physiological saline, and to which one-tenth of their volume of formal has been added. After mixing and keeping at 37° C. for one hour, normal sera give an opaque brown, very stable suspension and slow globular sedimentation; but when the reaction is positive a flocculant precipitate appears and become deposited, and the globules form a dark mass at the bottom of the tube. The blood of 25 out of 32 lepers, or 78 per cent., gave a positive reaction, which was rarely seen in 700 controls.

L. R.

Castro Paullier (V.) & Errecart (L.). [**Rubino's Leprosy Test.** — *Rev. Méd. Latino-Americana.* Buenos Aires. 1926. Sept. Vol. 11. p. 2197. [Summarized in *Jl. Amer. Med. Assoc.* 1926. Dec. 11. Vol. 87. No. 24. p. 2039.]

Rubino's test was carried out in 17 lepers and 5 controls; but the results were unsatisfactory, and proved positive in some nonleprous and negative in some leprous serums.

L. R.

Sakurai (Hosaku). **Re-Examination of Serological Reactions and Fermentation Diagnosis of Leprosy.** —*Hifuka Hitsunyokaka Zasshi* (*Jl. Urol. & Dermat.*). 1926. Apr. Vol. 26. No. 4. [Summarized in *Japan Med. World.* 1926. Dec. 15. Vol. 6. No. 12. p. 360.]

Serological tests were carried out by various methods on several hundred lepers. The author concluded that a comparatively high

percentage gave positive luetic serum tests; but the difference was that the syphilitic sera showed parallel reactions with the different tests in almost all cases whereas this was not the case with the leprosy sera.

L. R.

Lloyd (R. B.), Muir (E.) & Mitra (G. C.). **The Influence of Syphilis on Leprosy as indicated by the Wassermann Reaction.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 667–678. [8 refs.]

The authors report further work to determine if positive Wassermann reactions in lepers yield to antisyphilitic treatment, and they summarize their conclusions as follows :—

" 1. The percentage of positive Wassermann reactions in mild types of leprosy (A1 and B1 types) is 15 per cent., i.e., no higher than the average syphilis rate. In 100 per cent. of instances these reactions are abolished by antisyphilitic treatment. They are therefore all due to co-existing syphilis.

" 2. Where ordinary Wassermann techniques are employed the percentage of positive reactions obtained in the more advanced stages of skin leprosy (B2 and B3 types) is much higher than the above, averaging 50 per cent. or more according to the type of case. At least three-quarters of these positive reactions are due to syphilis, as evidenced by the effect of antisyphilitic treatment. The explanation of the high syphilis factor in the B2 and B3 types we believe lies in the fact that many Wassermann-positive leprosy cases tend to pass rapidly into the graver forms of the disease. Of the positive Wassermann reactions unaffected by antisyphilitic treatment in the advanced cases, some are possibly not caused by syphilis; as there is evidence in leprosy of a peculiar serum change which may lead to non-specific reactions. Weight must also be given to possible Wassermann-fast cases of syphilis in leprosy.

" 3. Antisyphilitic treatment of lepers is an indispensable adjunct to anti-leprotic treatment. In the application of this, it is important to avoid the use of drugs likely to lead to serious leprotic reactions. We believe we have found in Hg. 33 (Avenyl) a drug eminently suitable for the control of syphilis in leprosy.

" 4. To enable antisyphilitic treatment to be efficiently carried out, facilities for serological tests are essential.

" 5. A well-adjusted flocculation reaction such as that of Kahn is probably the serological test of choice for use in leprosy clinics.

" 6. The clinical effect of antisyphilitic treatment in Wassermann-positive leprosy cases is very remarkable. Some cases clear up on this treatment alone, and others are enormously improved.

" 7. Antileprotic treatment has no specific effect on the positive Wassermann reaction in leprosy.

" 8. The available evidence points to the conclusion that any non-specific reactions in the later stages of leprosy are due to experimental factors, and are not caused by reagins comparable to those responsible for complement fixation in syphilis. They will not therefore serve as a basis for any specific serum test for leprosy."

L. R.

Lemann (J. I.), Liles (R. T.) & Johansen (F. A.). **Blood Serum Calcium in Leprosy.**—*Amer. Jl. Trop. Med.* 1927. Jan. Vol. 7. No. 1. pp. 61–70. [12 refs.]

The authors found the serum calcium normal in lepers, and it was unaffected by bone absorption, fever, or the administration of chaulmoogra oil.

L. R.

Bargehr (P.). Künstliche lepraspezifische Allergie und aktive Immunisierung gegen Lepra. [**Induced Lepra-Specific Allergy and Active Immunization against Leprosy.**—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1926. Dec. 6. Vol. 49. No. 3-4. pp. 346–353.

Interesting experiments are described of attempts to produce immunity in the human subject by cutaneous inoculations with leprolin, made from leprous nodules by heating the minced nodules with a little water to boiling point in a water bath for 20 minutes, rubbing into a paste and adding 0·5 per cent. carbolic acid. Two small areas of skin are scarified on the upper arm, and the leprolin rubbed into one, the other serving as a control; and if no reaction occurs, after seven days, the process is repeated in the other arm, and further similar inoculations made up to five or more until a reaction occurs, in the form of some local redness and swelling. Of 15 Javanese in contact with lepers 12 gave positive reactions, usually after the second or third inoculation, and only occasionally after the fourth. In a second group of 12 children from a few months to 12 years of age positive reactions were only obtained in three of from 6 to 12 years old, after the second inoculation in two and after the third in one. In a third group of 8 children born in the leper colony of leper parents, and aged from half to ten years, but free from any sign of leprosy, one aged 12 reacted after the first inoculation, and 3 from 2½ to 9 years at the second; but the rest failed to react after even seven inoculations. It therefore appears that reactions are readily produced in healthy adults by two to five cutaneous inoculations of leprolin, but in children only a minority react, and the author thinks that positive reactions indicate that immunity has been produced. He is anxious that in some leprosy infected island with one to two thousand inhabitants, such as in the Moluccas, half the population should be immunized by up to five to seven inoculations of leprolin, until reactions result, including half the adults and half the children, and careful records kept to ascertain if protection is obtained; or he thinks it would be better still if half the population of an healthy island were inoculated and then lepers introduced among them to test the immunity produced, a suggestion that will hardly appeal to British workers.

L. R.

Indian Medical Record. 1926. Sept. Vol. 46. No. 9. Special Leprosy Number.

Terra (Fernando). Lepra e cancer.—*Brazil-Medico.* 1926. Oct. 30. Year 40. Vol. 2. No. 18. pp. 245–246.

SLEEPING SICKNESS.

Jamot (E.). La maladie du sommeil dans le nord du Cameroun. **Sleeping Sickness in the North of Cameroon.**] —*Ann. de Méd. et de Pharm. Colon.* 1926. July–Aug.–Sept. Vol. 24. No. 3. pp. 318–349. With 1 map.

In 1923, it was discovered that sleeping sickness existed on the banks of the Logone and Chari in the region of Fort-Lamy [this *Bulletin*, Vol. 20, p. 689]. In the present paper are recorded the observations made during the period Sept. 1924, to June, 1925, with a view to determining the importance and limits of this new focus and of formulating a practical scheme of prophylaxis.

In so far as Cameroons is concerned the focus is entirely limited to the Fort-Foureau subdivision and comprises a long narrow neck of territory between Tchad colony and Nigeria. Tchad lake, the Bas-Chari, the Bas Logone, the El-Beid and its tributary the Kalia, are the natural frontiers in the north, east, and west, and a conventional line separates it in the south from the subdivision of Yagoua. The paper is illustrated by a good map of the district. An account follows of the nature of the soil, the hydrography, the vegetation and the climate. The country is peopled by Kotokos, Arabs, Foulbés, Bornouans and Bananas: the dominant elements are the Kotokos, Arabs and Bananas; between them there is only one thing in common, and that is Islamism. A general description is given of these people and of their habits.

There then follows a detailed account of the incidence of sleeping sickness in the subdivision and statistics are given of the various villages visited. In all, some 29,366 persons were examined in the different portions of the division, and the total number of cases of sleeping sickness discovered was 1,948 (6·6 per cent.); of these 160 (8 per cent.) were very ill, and the number of deaths from the disease was 340 (1·1 per cent.). There is an interesting table in which are set forth the degree of infection amongst persons of different ages of the two sexes. Apparently, young children of below 5 years of age are much less infected than children over 5 years, and adolescents and adults. Amongst the males the morbidity was, up to 5 years, ·097 per cent.; from 6 to 15 years, 14·9 per cent.; from 16 to 25 years, 18·4 per cent.; from 26 to 50 years, 10·4 per cent., and above 50 years, 4·4 per cent. Amongst the females the morbidity for the same ages was ·2 per cent., 6·6 per cent., 4·8 per cent., 4·8 per cent., and 3·7 per cent. respectively.

There is a strict parallelism between the distribution of the disease and that of *Glossina tachinoides*.

Diagnosis was based on the microscope. The trypanosome was first sought by puncture of one of the cervical glands, then in cases where this was negative or there were no puncturable glands the blood was examined by the thick drop method: exceptionally recourse was had to lumbar puncture. In all, 9,256 examinations of gland juice and 11,261 of blood were made.

Of 11,482 suspected cases, 7,944 (27 per cent. of the population visited) had puncturable cervical glands and among these 1,507 (18 per cent.) were found to contain parasites. Subsequent blood examination revealed trypanosomes in 406 cases. Thus, of 1,913 cases diagnosed,

in 78 per cent. parasites were discovered in the gland juice and in 21 per cent. in the blood. There figures show that blood examination is a necessary complement to gland puncture, as the latter alone will allow a definite number of cases to escape observation.

The author emphasizes that it is very important to re-examine the suspects, preferably after an interval of 4 or 5 days, and that by this means 91 infections were discovered.

In regard to the state of the glands in the infected cases the author found that out of a series of 935 cases in whom trypanosomes had been found, 36 (3·8 per cent.) had no enlarged glands, 38 (4·0 per cent.) had glands which were not puncturable, 137 (14·6 per cent.) had small puncturable glands, 273 (29·1 per cent.) had glands which were atypical either as to number, form, size, or consistence, and 451 (48·2 per cent.) had glands in all respects typical.

With regard to treatment it was proposed to administer a mixed course of atoxyl and neo-arsenobenzol which has given particularly good results, but, unfortunately, an outbreak of recurrent fever caused the neo-arsenobenzol to be used for the latter purpose, and the sleeping sickness to be treated with atoxyl alone. About forty very advanced cases have been treated in a provisional hospital with tryparsamide with excellent results; details are given of four of these cases. The article closes with certain remarks on epidemiology and administrative prophylaxis.

W. Yorke.

Carpenter (G. D. Hale). **Report by the Senior Medical Officer in Charge Sleeping Sickness for 1925.**—*Uganda Protectorate Ann. Med. Rep. for the Year ended 31st December, 1925.* pp. 84–91.

In this report the author describes the position of sleeping sickness in the various infected areas.

(a) *The Victoria-Nyanza and The Victoria Nile-Jinja-Kakindu Area.*—No case of sleeping sickness has been found except in the neighbourhood of Mjanji, where the disease is endemic. Dr. Griffin reports that several cases seen in 1922 at Mjanji are alive and that the majority of the survivors are among those who received 2 or 3 injections of salvarsan substitute.

(b) *The Mpologoma Area and the Busitema Area.*—These were not visited and little is known of the extent of the infection.

(c) *The Siroko Valley Area.*—This was not visited and so far as is known the *G. palpalis* here is still uninfected.

(d) *The Katwe Area.*—This area was not visited by the author, but the District Medical Officer found no cases in the villages at Katwe and along the main road. One case was reported by natives at Kasenyi and seven others from Busongora. No cases were reported from Ankole or Kigezi.

(e) *The Bwamba Area.*—The District Medical Officer writes that every one of the recently reported cases was known to have been removed from a fly area some three or four years ago, and it is evident that the tertiary symptoms are only just developing. About a dozen cases appeared to have occurred in two villages outside the recognized sleeping sickness area.

(f) *The Wasa River Area.* The District Medical Officer reports that a boy was found to have sleeping sickness in Fort Portal, and that he had apparently come from the infected neighbourhood of the Wasa River Area.

(g) *The Buganda Lake Albert Area.*—This small uninhabited area was not visited.

(h) *The Bunyoro Area.*—In May the District Medical Officer reported a case of sleeping sickness from south of Hoima near the Kafu River, but he was probably infected in the Waki River Area. The Upper Waki basin was toured to ascertain whether inhabitants might similarly have become infected through visiting the Waki River. Over 2,000 persons were examined, but no case of infection found. The Medical Officer reports that the number of tax-payers in the re-occupied strip of the Bugungu coast is now 244, a considerable increase over last year. No fresh cases of sleeping sickness have been found nor have any been reported from re-occupied areas of Kyso and Tonia.

(l) *The Lango Area.*—This very small district calls for no comment.

(m) *The Nile Area.*—The author toured the parts in the West Nile District during August and September. He found the conditions more satisfactory than in 1922, and protective clearings were on the whole good, but it was probable that cases of sleeping sickness were being concealed. Over 7,000 men, women, and children were examined and six suspects subsequently investigated microscopically. Five were found to be infected.

A case of sleeping sickness was reported from Madi in October, and it is possible, therefore, that the northern main road from West Madi to Arua is infected.

Turning to the part in the Gulu District, it was found that the total number of deaths from sleeping sickness in the Acholi area for 1925 was 73 and in the Madi area 136.

The part in the Chua District was toured by the author in November. Only three cases of sleeping sickness have been found among about 12,000 people examined.

The following are the concluding remarks :—

"A great amount of work, mainly administrative, which requires detailed medical recommendations, still remains to be done on Lake Victoria, and in the Eastern Province especially. It has not yet been possible fully to supply all details required.

"For the Northern and Western Provinces detailed medical recommendations were supplied before the middle of 1925, as a basis on which the revised 'Instructions' which are needed could be drawn up, but these have not yet been promulgated. A centre for treatment has been established near Mjanji. In the Western Province more work requires to be done in the Bwamba and Katwe areas, and in the Northern Province the West Nile District requires more attention than can be given by the Senior Medical Officer posted to Arua.

"There has been a very decided improvement in the Acholi area of Gulu District, but in certain parts of the Madi area there has been an equally decided increase in the amount of infection which can only be dealt with by therapeutic measures. Prophylactic clearing can effect nothing further, for with very few exceptions all places on streams frequented lawfully by people leading normal lives are adequately cleared. Nothing can be done to protect by clearings, hunters or people who trespass into closed areas.

"Treatment centres have been established in East and West Madi, but it remains to be seen whether a single Medical Officer can cope with treat-

ment and frequent inspection of all the population in Madi on both sides of the river. The situation in the Acholi area of Gulu District and in Chua can probably be controlled by the District Medical Officers."

W. Y.

Maclean (George). **History of an Outbreak of Rhodesian Sleeping Sickness in the Ufipa District of Tanganyika Territory with Short Notes on Cases and Treatment.**—*Ann. Trop. Med. & Parasit.* 1926. Dec. 17. Vol. 20. No. 4. pp. 329–339. With 1 map.

This outbreak occurred in a portion of a large open forest which is said to extend, with few breaks, over an area of 50,000 square miles. Two rivers —the Rungwa and Ugalla— traverse the area ; during the rains they are several hundred yards wide, but in the dry season they are reduced to stagnant pools and form practically the only natural water supply of the area. The population lives in small scattered clearings which are frequently only a few acres in extent. A village may consist of anything from one to forty houses, usually of five to ten.

G. morsitans was the only tsetse found : except at certain centres it is scanty from the middle of the dry season (August–September) to the beginning of the rains (November–December), but towards the end of the rains to the beginning of the dry season it is practically co-extensive with the forest. Other biting flies met with are Tabanus, Haematopota and, in some places, Chrysops. Game is fairly abundant, those most frequently seen near human habitation being roan, bush-buck, oribi and allied species, bush-pig, wart-hog, and baboons.

Whether the disease has been endemic for an indefinite period or whether it is of recent introduction it is impossible to say. The natives regard it as a new disease which started at Tumbu, but they usually confuse other diseases, especially ankylostomiasis, with sleeping sickness and the question must remain open. The recent history is fairly clear. It is known that deaths occurred from a disease, characterized by swelling of the legs, as early as 1915, in the vicinity of the Mtate river, but what this was is uncertain. In 1920 21 a fatal disease, characterized by emaciation, swelling of the legs and death, established itself at Tumbu in which there were originally sixteen families ; within a year all these had either died or escaped to neighbouring villages. Kitundu and later Simbo were similarly attacked.

The author traces in great detail the spread of the epidemic from these centres, because he believes the history to show the importance of the human agent in spreading the disease when the incidence is high. Cases have occurred which could not be traced to a human infected focus, but Maclean thinks it not improbable that a more precise knowledge of their movements would elicit a connexion with a human source. The argument is supported by a diagram illustrating the incidence of the infection in various parts of the area. The estimated population of the whole area—the Baula Sultanate- comprising about 500 square miles, was, in November, 1924, about 563, and of these 62 were found to be infected between November, 1924 and December, 1925.

The causes of the outbreak are unknown, but certain disturbing factors may be important, especially the late War and influenza. The former led to considerable disorganization and movements of the population.

Remarks on diagnosis, symptomatology and treatment follow. Of 27 cases treated with " Bayer 205 " between November, 1924, and

March, 1925, 14 were still alive in March, 1926, and 8 had remained in good health without further treatment since December, 1924. One of these 8 had been ill for two months and the other seven for only a month or less before treatment. All the relapse cases, except possibly one, were more advanced and had had symptoms for two or more months before treatment. Two of these relapse cases are now in good health after tryparsamide.

Tryparsamide was tried in a few cases, but the results do not seem to be very encouraging. Maclean, however, thinks that it is not yet possible to make a fair comparison between the two drugs: he is now trying the effect of combined therapy.

W. Y.

Bevan (Ll. E. W.). **The Influence of Dipping in Solutions of Arsenic upon the Course of Trypanosomiasis.**— *Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. Pt. 4. pp. 284–289. Also in *Rhodesia Agric. Jl.* 1927. Feb. Vol. 24. No. 2. pp. 163–190.

Reference is made to the work of Lounsbury, Theiler, and Watkins-Pitchford, who devised a dipping solution containing arsenic in which cattle could be dipped at short intervals without harm. It was found, as a result of frequent immersion, that the tissues of the animal developed tolerance to the arsenic. The total eradication of ticks from an area can be accomplished by this short-interval dipping, and experiments have shown that ticks sown on a regularly dipped animal three days after the last dipping failed to develop, whereas others sown under similar conditions upon undipped animals came to maturity.

It has been frequently suggested that this process might be of use in the control of trypanosomiasis, and it was hoped that the arsenic absorbed as the result of frequent and regular immersion might act in one of the following ways:—

1. By poisoning the tsetse fly taking up blood from the skin in which the arsenic had become deposited.
2. By destroying the trypanosomes in the flies imbibing such blood.
3. By rendering the fly infertile.
4. By protecting the animal into which infective material was injected by the fly in the act of biting.

It is, however, a well-known fact that fly-struck cattle suffering from chronic trypanosomiasis will, when exposed to heavy rains, develop an acute attack of the disease. It was therefore feared that dipping might have a similar effect. In order to clear the point, experiments were conducted with guineapigs infected with two strains of trypanosomes, one, *T. rhodesiense*, obtained from an infected native, and the other, *T. brucei*, obtained from a naturally infected donkey.

Details of eight experiments are given. They indicate that dipping of guineapigs infected with trypanosomiasis in arsenic containing solutions of certain strength and at certain intervals causes disappearance of trypanosomes from the peripheral blood. The parasite, however, is not eliminated, but reappears after a shorter or longer interval when dipping is discontinued.

The result appears to depend on two factors:—

1. The strength of arsenic in the solution.
2. The frequency of the immersion.

Solutions containing 1 in 300 of Cooper's cattle dip did not cause disappearance of the parasites from the blood when the animals were

immersed at intervals of three days, nor did they exert any protective effect against syringe infection. With solutions of 1 in 156 of the cattle dip, the parasites disappeared after three, four, or six dippings, and such solutions, although they did not entirely protect the animals, arrested the development of the parasite when injected with the syringe.

The experiments show that the effect of dipping upon the parasite is due to the absorption of arsenic and its gradual accumulation. They also indicate that immersion in cold water of guineapigs infected with trypanosomiasis hastens the course of the disease, corresponding with the practical observation that fly-struck cattle when exposed to heavy rains rapidly succumb.

W. Y.

Boyé (L.). La prophylaxie de la trypanosomiase en Afrique équatoriale. Résultats de la méthode des six injections consécutives d'atoxyl. [**Prophylaxis of Sleeping Sickness. Six Consecutive Injections of Atoxyl.**]—*Bull. Soc. Path. Exot.* 1927. Jan. 12. Vol. 20. No. 1. pp. 55–56.

As a result of their work during 1922 to 1924 at Brazzaville, Blanchard and Laigret found that the customary prophylactic course—two injections of atoxyl at a week's interval—gave a minimum blood relapse of 25 per cent., whilst a course recommended by them—six injections at ten-day intervals—gave only about 6 per cent. of relapses within a year's observation. In June, 1924, the *Société de pathologie exotique* recommended the adoption of this new method, and on his return to Africa in September, 1924, the author decided to put it into operation. Up-to-date information is available concerning two districts—the middle Congo and the Oubangui.

In the middle Congo 192 cases were treated and 34 (17 dead and 17 absent) were not re-examined; in the remaining 158 examination of the blood was negative in every case; more detailed examination, such as blood centrifugation, gland puncture and spinal puncture, was not made. These results were obtained a year after the injections.

In the Oubangui the patients were re-examined 14 months after the course of injections: of 60 in the first stage 3 per cent. exhibited parasites in the blood and of 40 in the second stage 7·5 per cent. had blood relapses.

The author considers these observations to justify the method and he has given instructions for its adoption to the exclusion of all others.

W. Y.

Ledentu (G.) & Daude (J.). Essai du traitement de la trypanosomiase humaine par le 270 Fourneau. [**Treatment of Trypanosomiasis by Fourneau 270.**]—*Ann. Inst. Pasteur.* 1926. Oct. Vol. 40. No. 10. pp. 830–845.

Fourneau 270 is one of the series of phenylarsenic acids studied by Tréfouel and Trévise. It is the sodium salt of acetyl-p-amino-o-oxyphenylarsenic acid and is a white powder readily soluble in water. The authors used a 20 per cent. solution prepared at the time and injected it subcutaneously. The injections are painless and absorption is rapid; no abscess formation or local irritation occurs when solution is complete, but when some of the drug remains undissolved there is a

mild local inflammation. Experiments on mice showed that the ratio of the curative to the toxic doses is as 1 is to 12·5.

Preliminary observations made by LAIGRET at the Institut Pasteur, Brazzaville, indicated that in the first stage of sleeping sickness the dose of ·001 gm. per kilo led to the disappearance of trypanosomes from the glands in 48 hours and that the sterilization lasted 11 days ; with doses of ·005 gm. per kilo the trypanosomes disappeared from the glands in less than 21 hours and reappeared, not in the glands, but in the peripheral blood, between the fourth and fifteenth days ; and finally with doses of ·01 gm. per kilo the glands diminished in size and after the third day became sterile, but parasites reappeared in the blood between the twentieth and twenty-ninth days.

The authors recommend the administration of gradually increasing doses commencing with 1·5 cgm., 2 cgm., 2·5 cgm., 3 cgm. and gradually working up to as much as 5 cgm. or 6 cgm. per kilo. of body weight. The injections should be given at about weekly intervals. Of 15 patients in the first stage of the disease thus treated 2 died apparently as the result of 4 cgm. doses—an accident which it is stated should easily be avoided by prudent technique ·2 relapsed and 11 remained sterile during an observation period of from three to six months after having had quantities varying from 2 to 28 cgm. per kilo.

In patients of the second stage the preliminary observations of LAIGRET have shown that the drug exerts a profound influence on the meningeal reaction. Even a single injection of such small doses as 1 cgm. or 1·5 cgm. per kilo. may lead to disappearance of the trypanosomes and to a marked decrease of albumin and lymphocytes. In all, 33 patients of the second stage have been treated by LAIGRET and TRÉVISE and by the authors. One of these was at the commencement of the second stage, and after two small doses of the drug the spinal fluid became normal within three months, the lymphocytes falling from 70 to 4 per cmm. In patients definitely in the second stage with marked changes in the spinal fluid, the results were very good. In those cases exhibiting advanced symptoms such as somnolence, tremors and inco-ordination, the results are very important. They comprise 19 cases, of which 4 are dead, 1 is blind, 1 has amblyopia, 1 relapsed, 7 are ameliorated and 5 are cured as judged by return to normal of the spinal fluid. Details of a number of typical cases are given.

Dealing with untoward symptoms and accidents resulting from the drug, the authors state that of the first, fever and cephalalgia are the most common, although temporary loss of weight is often observed during the course of injections. Abdominal pains and vomiting are indications to stop the treatment. The accidents are those common to arsenicals, viz., ocular troubles and death. As the result of their experience the authors consider that in the first stage of the disease it is essential to start with small doses working up rapidly to such large doses as 6 cgm. to 8 cgm. per kilo of body weight : the total quantity given should be at least 30 cgm. per kilo. In patients of the early second stage, the authors have often reached the dose of 5 cgm. per kilo without bad effects ; good results have been obtained with a total quantity of 25 cgm. per kilo. In patients of the late second stage the reactions are much more variable and impose caution ; the best results have been obtained with total doses of 20 to 25 cgm. per kilo. Finally, in patients very advanced in the last stage of the disease the doses must be extremely small, e.g., 1 cgm., 1·5 cgm., 2 cgm. and

2·5 cgm., and the total quantity should not exceed 10 to 15 cgm. per kilo.

The authors conclude that "Fourneau 270" is a powerful trypanocidal agent. Its action in cases of the first stage is a little uncertain, but it is as yet premature to form a definite conclusion; but its action on cases in the second stage is superior to that of atoxyl and comparable with that of tryparsamide.

W. Y.

Van den Branden (F.). Suite de l'observation de quelques trypanosés traités au Bayer 205. [**History of Sleeping Sickness Patients treated by Bayer 205.**] *Ann. Soc. Belge de Méd. Trop.* 1926. Dec. Vol. 6. No. 3. pp. 227–230. [1 ref.]

In this paper the later history is given of seven patients in the first stage of sleeping sickness fever, enlarged glands and spinal fluid containing not more than 15 cells per cmm. who had been treated with 3·5 gm. of "Bayer 205." The observation of these cases has lasted for at least 3 years after treatment. All these patients can now be regarded as definitely cured. Special attention is drawn to two of the patients who relapsed with trypanosomes in the blood some weeks after the end of treatment and who, after showing parasites irregularly for some months, finally lost their trypanosomes without further treatment and have remained negative for two years since the last appearance of parasites. [For the earlier history see this *Bulletin*, Vol. 22, p. 135].

W. Y.

Ledentu (G.). Sur le pouvoir protecteur du sérum sanguin vis-à-vis du *T. gambiense*, après injection de "309 Fourneau." [**Protective Power of Blood Serum against *T. gambiense* after Injection of Fourneau 309.**]—*Bull. Soc. Path. Exot.* 1926. Nov. 10. Vol. 19. No. 9. pp. 838–844.

The author has undertaken experiments to ascertain whether the serum of men and cattle treated with "Fourneau 309" exerts a protective action against *T. gambiense* as has already been shown to be the case with "Bayer 205" by Mayer and Zeiss.

The conclusions are:—

The serum of an ox treated with "Fourneau 309" and injected with *T. gambiense* into a guineapig protects it against infection when the serum has been withdrawn within 48 hours of the injection of the drug.

The minimum protective dose is 1 cc. of serum for a standard dose of the virus.

When mixed with a standard dose of the virus in quantities of ·1cc. and ·2 cc. the serum neither protects nor prolongs the incubation period, but it retards the progress of the disease, especially when it has been withdrawn within 48 hours of injection of the drug.

When withdrawn four days after injection of the drug, the serum no longer protects, even in doses of 2 cc., against a standard dose of the virus; it simply prolongs the incubation period by some days.

The protective action of the serum is in proportion to the quantity of drug in the circulation; the elimination of the drug is rapid during the first two or three days, but then becomes slow as is shown by the fact that serum withdrawn 14 days after administration of the drug is similar to that withdrawn 4 days afterwards.

The protected animals are not immunized against a large inoculation of the same virus, but the incubation period is prolonged in direct proportion

to the shortness of the interval which elapsed between injection of the drug and withdrawal of the serum; and the duration of the infection is similarly prolonged.

W. Y.

KELLERSBERGER (E. R.) Traitement de la maladie du sommeil par la tryparsamide. Observation de 100 cas. [**Treatment of Sleeping Sickness by Tryparsamide, 100 Cases.**]—*Bull. Méd. du Katanga.* 1926. Dec. Vol. 3. No. 4–5. pp. 132–150. [3 refs.]

During the last two years about 1,000 cases of sleeping sickness have been treated at the Bibanga hospital of the American Presbyterian Congo Mission. The patients were drawn from a radius of over 200 km. A camp established near the hospital rendered possible the treatment and careful observation of the cases. The drugs used were atoxyl, soamin, "Bayer 205," and tryparsamide. The results obtained with "Bayer 205," are given in a previous article [this *Bulletin* Vol. 23, p. 906], and it is with those obtained with tryparsamide that the present paper is concerned.

The patients were divided into four classes. The first comprises early cases without marked clinical symptoms and without change in the central nervous system; the second contains cases with slight changes in the spinal fluid accompanied by slight symptoms of invasion of the nervous system; the third category includes cases with important changes in the spinal fluid and grave clinical symptoms; and the fourth comprises very advanced cases which had been previously treated with other drugs and had relapsed.

Each patient was weighed on admission to hospital, and a thick blood film, gland juice, and spinal fluid examined. Most cases, 75 per cent., were diagnosed by gland puncture, about 15 per cent. by blood examination and a number of the very advanced cases by lumbar puncture. In all recent cases the trypanosomes were found most easily in the blood. At the beginning of the second period, when the glands are enlarged, the parasites are numerous (3 to 4 to a field) in the blood and gland juice. As the glands decrease in size and become gradually indurated, the chances of finding trypanosomes are much smaller.

The quantity of the drug given varied in each case; patients in an advanced stage are less tolerant and a much smaller dose is accordingly indicated. Accidents, as a result of the injection, were very rare; there was only one case of blindness from too large doses of the drug; a few cases exhibited temporary derangement of vision, but on decreasing or stopping treatment this subsided. The other untoward sequelae were trifling and very rare.

The results obtained are very encouraging and much better than with any of the other drugs. Some of the cases which were at the time of treatment desperate or *in extremis*, and others which were violent, or irresponsible, or degenerate, have become new men and women. Further observation suggests that they have been completely cured—some of the cases have been observed for more than a year and others for nine months. The native himself is greatly impressed and readily submits to such operations as lumbar puncture.

All the hundred cases treated are alive and well except one woman who had a hemiplegia as the result of the disease. The results of treatment in 48 cases—12 belonging to each group—are clearly set forth in 4 tables, which give the number, name, sex and age period of the patient, the number and quantity of injections of the drug given, the

weight of the patient immediately before and after treatment and four months later, and the state of the spinal fluid as regards its appearance, protein content, and cell content, before, and immediately after treatment, and also at one or two subsequent periods 3 to 9 months later, and finally the general clinical state of the patient at the time of writing.

[This paper is a valuable one ; the data are clearly set out and it is to be hoped that the cases will be followed up and the information published in a more generally accessible journal.]

W. Y.

Van den Branden (F.). Note préliminaire sur les essais de traitement de la trypanosomiase humaine chronique par l'acétylarsan. [**Trial of Acetylarsan in the Treatment of Chronic Trypanosomiasis.**] —*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 218–221.

Acetylarsan is the oxyacetylaminophenylarsenate of diethylamine U. R. It can be injected under the skin and into the muscles without pain. The therapeutic action of the drug was tested in ten cases of chronic trypanosomiasis. The observations have not yet been carried to a sufficient length to enable definite conclusions being drawn, but it appears that, thanks to its neurotropic action and the ease of its administration, the drug is useful in the treatment of chronic trypanosomiasis, but it is doubtful whether it is so useful as tryparsamide.

In the discussion which followed this paper, Mesnil remarked that Ledentu and Vaucel at Brazzaville had found the drug less useful than the ordinary remedies, viz. atoxyl in the first period and tryparsamide in the second.

W. Y.

Van den Branden (F.). Le "Heyden 661" ou antimosan dans le traitement de la trypanosomiase humaine. [**Antimosan in the Treatment of Human Trypanosomiasis.**] —*Bull. Soc. Path. Exot.* 1926. Oct. 13. Vol. 19. No. 8. pp. 688–691. [2 refs.]

In contrast to stibenyl and stibosan ("Heyden 471"), which contain antimony in the pentavalent form, antimosan ("Heyden 661") contains trivalent antimony. An aqueous solution is neutral and can be introduced into the muscles without appreciable pain, and injections made under the skin of the back are likewise not painful. The therapeutic action of the drug was tested in eight cases of sleeping sickness, details of which are given. It was found to be less energetic than tartar emetic and furthermore its action was transient. The general condition of the chronic cases treated by the drug rapidly got worse, and the conclusion is reached that antimosan, no more than stibenyl or stibosan, can replace emetic in the therapy of sleeping sickness.

W. Y.

Levaditi (C.), Nicolau (S.) & Galloway (I.). Essais de prophylaxie des trypanosomiases par des dérivés phényl-arseniques administrés *per os*. [**Prophylaxis of Trypanosomiasis by Phenyl Arsenic Derivatives by the Mouth.**] —*Bull. Soc. Path. Exot.* 1926. Oct. 13. Vol. 19. No. 8. pp. 737–746. [1 ref.]

Amongst the phenyl derivatives of pentavalent arsenic studied by the authors, tryparsamide and "Fourneau 270" administered *per os*

exert a most efficient prophylactic action against nagana infection in rabbits. Stovarsol and "Fourneau 192" are distinctly less useful in this respect. Tryparsamide seems superior in its preventive properties to "Fourneau 279" in view of the fact that it results in the blood and spleen of the treated rabbits remaining always negative as indicated by inoculation into mice, whereas this was not always the case in rabbits which had been given "Fourneau 270." The prophylactic doses used by the authors were in the case of both drugs in the region of the dose which the animals could tolerate.

The authors infer from these experiments that sleeping sickness prophylaxis by the oral administration of drugs is possible, and suggest that in the case of human beings the drugs should be given by the mouth in small frequently repeated doses.

W. Y.

Schumacher (C.). Tierexperimentelle Beiträge zur Nagana- und Lueserkrankung und zur Heilwirkung des Salvarsans. [**Experimental Observations on Nagana and Syphilis and on the Curative Action of Salvarsan.**] – *Arch. f. Dermat. u. Syph.* 1926. Nov. 13. Vol. 152. No. 1. pp. 211–238. [72 refs.]

In the experiments described in this paper, the author used a strain of *Trypanosoma brucei* obtained from Morgenroth at the Robert Koch Institute, Berlin; and three strains of spirochaetes of which one was the so-called "Truffivirus" obtained from Plaut and Mulzer at Munich, and the other two isolated by the author himself from cases of human syphilis.

The following summary of this paper is given :—

1. The infection in mice caused by inoculation of the trypanosome strain used by the author followed the usual course.
2. The disease in rabbits resulting from weak intracutaneous injection followed regularly the characteristic course described by Stühmer and exhibited clinical separation into primary and secondary stages.
3. Superinfection of nagana infected rabbits was successful only in the first stage and at the commencement of the second stage.
4. As has already been shown by Stühmer the curative dose of salvarsan was in the secondary stage about six times as great as in the primary stage.

. . . . . .

5. Examination of the blood for arsenic showed that after intravenous injection of neosalvarsan the quantity of arsenic rapidly falls and that this is especially the case in the first few minutes after the injection.
6. Definite quantities of arsenic were found in the spinal fluid after large intravenous injections of neosalvarsan; the greatest amount was found 60 to 120 minutes after injection.
7. This arsenic showed in animal experiments a definite although feeble parasiticidal power.
8. Subcutaneous and intramuscular injections of neosalvarsan were in mice more toxic than intravenous injections.
9. Subcutaneously and intramuscularly injected neosalvarsan is, after the administration of sufficiently high doses, present in the blood 10 to 15 minutes later in such high concentration that it is possible to cure nagana infected mice with it.
10. Therapeutic experiments with the blood of animals, which have been treated intravenously with large doses of neosalvarsan, were curative when withdrawn within half an hour for nagana mice, within two hours for syphilic rabbits and within three hours for nagana rabbits.
11. This curative result is dependent on the presence of salvarsan or arsenic compounds in the circulating blood. Besides this, however, it is

probable that one has to reckon with active substances produced by the blood donor as the result of stimulation of the arsenic, which of themselves do not suffice to produce any recognisable effect. Their therapeutic power must be quite small in proportion to that of the arsenic or salvarsan combinations. The author believes that results obtained with salvarsan containing blood are directly due to the salvarsan itself.

W. Y.

Bruynoghe (R.) & Dubois (A.). Action thérapeutique du paraglycinamide-phenylarsinate de sodium dans l'infection à trypanosome inopinatum de *Rana esculenta*. [**Therapeutic Action of Paraglycinamide-phenylarsinate of Sodium in *T. inopinatum* Infection.**] —*Ann. Soc. Belge de Méd. Trop.* 1926. Dec. Vol. 6. No. 3. pp. 231–234. [1 ref.]

The authors have studied the action of a recent arsenical derivative —the paraglycinamide-phenylarsinate of sodium (Tryponarsyl Meurice) on *T. inopinatum* of the green frog. The conclusions are :—

1. Tryponarsyl has a therapeutic action on *T. inopinatum* (in doses of ·5 cgm. per gramme). Possibly repeated doses might lead to definite cure.
2. The drug has no action on *T. rotatorium*.
3. *In vitro* the drug in the concentrations of 1 in 100 and 1 in 200 has no action in 18 hours on the motility of the trypanosomes.

W. Y.

Schnitzer (R.). Ueber den Antagonismus trypanocider Heilmittel. [**On the Antagonism of Trypanocidal Drugs.**]—*Klin. Woch.* 1926. June 11. Vol. 5. No. 24. p. 1090. [1 ref.]

——. Untersuchungen zur Chemozeptorentheorie. I. Das Interferenzphänomen von Browning und Gulbransen. [**Investigations on the Chemo-Receptor Theory. I. The Interference Phenomenon of Browning and Gulbransen.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1926. May 5. Vol. 47. No. 2. pp. 116–133. [11 refs.]

—— & Rosenberg (E.). Untersuchungen zur Chemozeptorentheorie. II. Die Hemmungswirkung des Parafuchsins gegenüber trypanoziden Arsenikalien. [**II. The Inhibiting Action of Parafuchsin on Trypanocidal Arsenicals.**]—*Ibid.* July 30. Vol. 48. No. 1. pp. 23–33. [1 ref.]

—— & Silberstein (W.). Untersuchungen zur Chemozeptorentheorie. III. Die Hemmungswirkung des Parafuchsins gegenüber Brechweinstein. [**III. The Limiting Action of Parafuchsin on Tartar Emetic.**]—*Ibid.* Dec. 23. Vol. 49. No. 5. pp. 387–392. [3 refs.]

—— & Rosenberg (E.). Untersuchungen zur Chemozeptorentheorie. IV. Vergleich des Interferenzphänomens an parafuchsinfesten und normalen Trypanosomen. [**IV. Comparison of the Interference Phenomenon in Parafuchsin-Fast and Normal Strains.**] —*Ibid.* pp. 393–399. With 3 curves in text. [3 refs.]

In 1922 Browning and Gulbransen described a peculiar interference phenomenon which they had observed in the trypaflavin treatment of a strain of trypanosomes resistant to parafuchsin [this *Bulletin*, Vol. 19, p. 882.] This parafuchsin-fast strain was fully sensitive to trypaflavin ; if, however, the trypaflavin treatment was preceded by a parafuchsin feeding of the mouse, so that small quantities of parafuchsin were still present in the animal organism, the action of the trypaflavin was inhibited. This phenomenon, which is one of especial interest, requires

to be brought into agreement with EHRLICH'S chemoreceptor theory. The classical observation on drug resistance shows that the point of attack of parafuchsin—a parachinoid dye—must be other than that of the arsenicals and of the orthochinoid dyes such as trypaflavin. Still more striking is the fact that the observations were made on a parafuchsin-fast strain, in which, according to accepted views, the avidity of the parafuchsin receptors is reduced to a minimum.

Experiments confirmed completely the observation of BROWNING and GULBRANSEN. Instead, however, of feeding the mice with parafuchsin, it was injected in watery solution thereby rendering possible a quantitative estimation of the inhibition of the trypanocidal action of trypaflavin. Reference is made to two somewhat comparable observations, viz., that of MORGENROTH and ROSENTHAL, on the inhibition of the action of tartar emetic by potassium hexatantalate, and that of VOEGTLEIN on the inhibition of aminophenyl arsenoxide by sulphhydryl compounds. There is an essential difference between the limiting of the effect of trypaflavin by parafuchsin and the other two inhibitory phenomena. Potassium hexatantalate acts, at least in a small degree, as antidote to tartar emetic; the sulphhydryl compounds neutralize arsenoxide in very high degree. On the contrary the toxic action of parafuchsin combines with that of trypaflavin and the arsenicals; and there thus exists a synergism of toxic action with an antagonism of trypanocidal action.

With parafuchsin-fast strains the antagonistic action of parafuchsin also extends to the arsenical compounds arsacetin and salvarsan. The quantitative differences in the limiting action of parafuchsin, within the first four hours after parafuchsin treatment, against definitely active amounts of trypaflavin, arsacetin, and salvarsan are given in a table. The figures show that measured by the limiting concentration of the parafuchsin, the trypaflavin is most strongly influenced, less so arsacetin and least of all salvarsan. The quantitative differences in the limitability of the trypanocidal activity of these three substances rests obviously on differences of avidity which can be estimated on the basis of the numbers obtained.

The limitation of the trypanocidal action of trypaflavin, arsacetin and salvarsan by parafuchsin occurs also—with certain quantitative differences—with normal trypanosome strains fully sensitive to all the drugs concerned.

The significance of these phenomena on the basis of the chemoreceptor theory must be traced back to a complex structure of the chemoreceptor, a subject which has already been incidentally referred to by EHRLICH. A critical analysis of the experiments and theoretical considerations arising out of them are dealt with in the subsequent papers.

W. Y.

DURHAM (F. M.), MARCHAL (J.) & KING (Harold). **Some Observations on the Trypanocidal Action of Arsenicals.**—*Jl. Pharm. & Experim. Therap.* 1926. Sept. Vol. 28. No. 3. pp. 341–349. [11 refs.]

The views of EHRLICH regarding the mode of action *in vivo* of arylarsinic acids (atoxyl type) and VOEGTLIN and SMITH'S explanation of the activity of arylarseno-compounds (salvarsan type) imply that neither type is directly parasiticidal, but that in the tissues the former are reduced and the latter oxidized to the active agents the arylarsenoxides, thus :—

$$R\text{–}AsO(HO)_2 \xrightarrow{\text{reduction}} R.AsO \xleftarrow{\text{oxidation}} R.As : As.R.$$

It has been shown by one of the present authors that these views are applicable to more complex arylarsinic acids of Type I (I) $R^1.CO.NH.\ R.AsO.\ (HO)_2$. (II.) $R^1.SO_2.NH.R.AsO\ (HO)_2$ having as a common feature the link —CO.NH— When, however, in the same complex this link is replaced by the analogous sulphonamide group $-SO_2.NH-$ as in type (II) the products exhibit no trypanocidal action *in vivo* or *in vitro* and in the one case where the reduction products of the acid were examined, viz., aminotoluenesulphonylaminophenylarsinic acid, the corresponding arseno-compound is also inactive under both conditions, whilst the arsenoxide though inactive *in vivo* renders trypanosomes non-infective *in vitro* at dilutions of 1 in 10,000 and 1 in 40,000 in 30 and 300 minutes respectively.

It is suggested that the reduction potential of the tissues is insufficient to reduce the sulphonamide type of arsinic acid to the arsenoxide and that, conversely, injected arsenoxide is oxidized to the inactive acid.

T. A. Henry.

Browning (C. H.), Cohen (J.B.), Ellingworth (S.) & Gulbransen (R.). **Aminostyryl Quinoline and Aminoanil Quinoline Compounds. A New Group of Trypanocidal Agents.**—*Jl. Path. & Bact.* 1926. July. Vol. 29. No. 3. p. 317. [2 refs.]

Quinoline methochlorides having an aminostyryl—or dimethylaminostyryl group substituted at position 2 and an acetylamino group at position 6, or with these substituents interchanged in position, exhibit marked trypanocidal action in the infection of mice with *Tr. brucei* (two strains used, one being "Prowazek"). The chemotherapeutic index for subcutaneous injections, 24 hours after infection, is 50:1, but the compounds act irregularly and a dose one-sixth of the maximum tolerated may prove ineffective. Dourine infections also respond but are less easily influenced.

The trypanocidal action disappears with the absence of the amino-group from the quinoline nucleus; its replacement by a methyl group increases the toxicity and the hydrochlorides, as distinct from the methochlorides, are without trypanocidal action. The latter increases and the toxicity falls when the amino-group is acetylated.

Rabbits with *Tr. brucei* infection well developed have been cured by a single subcutaneous dose (0·02 to 0·025 gramme per kilo body weight) of 2 (*p*-aminostyryl)-6-acetylaminoquinoline methochloride or 2 (*p*-acetylaminostyryl)-6-dimethylaminoquinoline methochloride. A strain of trypanosomes tested in mice and found resistant to one of the above compounds proved susceptible to moderate doses of tryparosan or "Bayer 205."

The anil analogues of the styryl derivatives are less toxic but also weaker trypanocides.

T. A. Henry.

Kligler (I. J.) & Weitzman (I.) **Susceptibility and Resistance to Trypanosome Infections. I. Attempts at Immunization with Dead and Attenuated Trypanosomes.**—*Ann. Trop. Med. & Parasit.* 1926. June 24. Vol. 20. No. 2. pp. 147–160. [6 refs.]

There is little doubt that there exists a type of immunity or resistance to malarial parasites, but the mechanism of this immunity or resistance

is still obscure. Experimental investigation in this disease is difficult, and consequently the authors have attempted to study the mechanism of susceptibility and resistance to a protozoon infection, a trypanosome pathogenic for laboratory animals. The parasite used was *T. evansi* isolated from an infected mule; this produces in rabbits a chronic relapsing disease.

In a previous communication (this *Bulletin*, Vol. 23, p. 56) the authors showed (1) That by the usual procedure it is not possible to demonstrate humoral parasiticidal antibodies; (2) that there is a definite change in the leucocyte picture during the course of the disease; (3) that by disturbing the leucocyte balance by the injection of olive oil a relapse or blood invasion may be produced at will; and (4) that animals cured with "Bayer 205" acquire an absolute resistance, of greater or lesser duration, to a re-infection.

As a result of this work it was inferred that in the course of the infection the resistance offered to the invasion of the blood stream is repeatedly broken down (probably by substances liberated by the parasites which continue their activity in the tissues), and trypanosomes penetrate into the circulation and go through a period of active development. The destruction of the trypanosomes in the circulation leads to a partial immunization resulting in a disappearance of parasites from the circulation. This assumption pre-supposes a double property of the parasitic cell; one sensitizing, the other immunizing.

The object of the present work was to ascertain whether by the injection of dead and attenuated parasites it is possible firstly to simulate the changes observed in the host during the natural course of an infection, and secondly to increase the resistance of the host to infection. The experiments were of two kinds, the first dealing with the sensitization of animals by the injection of dead trypanosomes and trypanosome extracts, and the second with the resistance of animals treated with trypanosomes suspended in "Bayer 205."

The repeated injection of whole or autolysed trypanosomes fails to increase the resistance of the animal, but on the contrary renders it hypersensitive in so far as invasion of the peripheral blood is concerned. The most striking effect is produced by a long series of injections of whole heat-killed trypanosomes. These injections seem in no way to have modified the later course of the disease, except that the treated animals more often showed marked swelling and oedema, a condition which is found in untreated animals only after the disease has progressed for some time and become chronic. The blood changes were studied during the preparatory treatment, pre-infection, and post-infection stages, as well as the cellular reaction in the peritoneal cavity subsequent to the infection.

Having failed to induce any sort of immunity by repeated injections of trypanosomes, either intact or autolysed, a series of experiments was undertaken to determine whether any immunity could be obtained by treating animals with a mixture of dead or attenuated trypanosomes and "Bayer 205." The results indicate that trypanosomes suspended in "Bayer 205" behave quite differently from those suspended in saline, and that the animals so treated, instead of becoming hypersensitive, develop a resistance quite distinct from that induced by the same quantity of the drug alone.

In so far as the experiments reported in this paper simulate the changes occurring in the infected animals, it appears that the manifestations of the disease are due to a progressive sensitization of the

host by the parasite or its product. The periodic invasion of the blood stream seems to depend on the repeated breaking down of some barrier by the trypanosomes multiplying in the animal organism. In infected normal animals a period of incubation is required for sensitizing the animal before the peripheral circulation can be invaded. Similarly, the appearance of swelling and oedema is due to a prior sensitization by the trypanosomes or their products. In animals previously treated by the injection of the same strain of trypanosomes, killed, attenuated or disintegrated, swelling of the ears and eyelids occurs promptly after the infection simultaneously with the invasion of the circulation. When, however, the trypanosomes are injected with " Bayer 205 " an exactly opposite state is established in the animals. Instead of being hypersensitive, the animals manifest an increased resistance which sometimes is sufficient to ward off an infection. It is difficult to imagine what peculiar transformation is brought about by the drug which results in such markedly different reactions. It would appear that the drug combines in some way with the trypanosome cell, producing a heterogenic antigen capable of stimulating the formation of specific antibodies.

W. Y.

Kligler, (I. J.) & Weitzman (I.). **Susceptibility and Resistance to Trypanosome Infection. II. The Relation of Physical Environment to Host Susceptibility to Infection.**— *Jl. Experim. Med.* 1926. Sept. 1. Vol. 44. No. 3. pp. 409–417. [10 refs.]

In this paper the authors record observations on the effect of external environmental factors, as for example, light and moisture, on the susceptibility of the host to trypanosome infection and on the severity of the disease imposed.

The strain used was *T. evansi* isolated from infected mules ; it invariably produced a fatal infection in guineapigs and rabbits. In the former the incubation period is constant, varying from 5 to 8 days ; the intensity of the infection as measured by the frequency of blood invasion is also fairly constant, but the duration of the disease shows a tendency to seasonal fluctuations. In these experiments guineapigs of approximately the same weight were used. In general the animals used in a given experiment were first examined, and then subjected to the conditions of the experiment for some days prior to the infection , the changes due to the infection as such could, therefore, be distinguished from those produced by the exposure to light, darkness or moisture.

It was difficult to select a suitable criterion for decreased or increased susceptibility ; the length of the incubation period is the most constant phenomenon, but the frequency and intensity of the blood invasion and the duration of the illness are also of value. It was first necessary to ascertain whether exposure to one or other of the conditions to be tested produced a measurable change in the host susceptibility. Guineapigs were exposed for various lengths of time to the action of direct sunlight and an equal number of comparable controls were kept in total darkness or under ordinary light conditions ; in order to eliminate the heat factor other animals were exposed to direct sunlight whilst immersed in water baths.

Preliminary experiments were made to determine the effects of the exposure under the various conditions of the experiments on the

temperature, white cell, and differential counts of the animals. The results are set forth in tables which show that an exposure of 15 minutes to direct sunlight raises the rectal temperature 1·5° C. or more, and changes the leucocyte formula. The temperature effect is temporary, lasting about 2 hours, but the blood cell change is more enduring and recovery is very slow. Insolation through a water bath produces none of these changes; the rectal temperature falls about 2·5° C., the blood cell formula remains unchanged, and there is an increase in the total leucocyte count.

Preliminary experiments show that exposure to the conditions described, even though of short duration, produced appreciable changes in the course of the infection. Exposure to direct sunlight for 15 minutes shortened the incubation period to 3 days, while in the animals insolated under water for the same period the incubation period was only two days and there was a prompt and heavy invasion of the blood. The duration and time of exposure made an appreciable change in the results in animals infected with the trypanosome. A single exposure of half an hour on the day of infection reduces the incubation period, and shortens the duration of the illness by about half. A longer exposure, 1 hour or more, may cause sudden death with acute symptoms. It was found that the animals kept in ordinary diffused light and especially those kept in total darkness were more resistant to the infection than those exposed for brief periods to the direct action of sunlight. Immersion, whether in direct sunlight or not, resulted in a definite lowering of the resistance of the guineapigs to infection.

W. Y.

THOMSON (J. G.) & ROBERTSON (Andrew). **Variations in the Virulence and in the Morphology of Certain Laboratory Strains of** *Trypanosoma gambiense* **and** *Trypanosoma rhodesiense* **isolated from Human Cases.** *Jl. Trop. Med. & Hyg.* 1926. Dec. 15. Vol. 29. No. 24. pp. 403–410. With 1 chart in text. [13 refs.]

Observations on five distinct strains of trypanosomes isolated during recent years from human cases, four of which were *T. gambiense* and one *T. rhodesiense*, showed that with the passage of time strains, mechanically transmitted, may change entirely in their morphological characters, and further, that under certain conditions the typical morphological features of the original strain can be obtained again. The history of the five strains is as follows:—

Strain H. A European infected at Mabang, Sierra Leone, in December, 1918; the strain was obtained by inoculating rats on February 20th, 1919.

Strain H2. Originated from the same patient on October 8th, 1920.

Strain J. A European infected in the Upper Kwilu district of the Belgian Congo in January, 1920; the strain was obtained by inoculating rats on June 1st, 1920.

Strain MA. A European apparently infected in Southern Nigeria in July, 1921; rats were inoculated on November 10th, 1921.

Strain M. A European infected in Northern Rhodesia in December, 1921; he was treated with "Bayer 205" during 1922 and on January 4th, 1923; the strain was obtained by inoculating rats.

The authors give the following summary of their observations:—

"(1) *T. rhodesiense* can be inoculated easily from man to rats. In Strain M parasites appeared in the blood of the rat five days after the

injection of human blood. Strains of *T. rhodesiense* rapidly increase in virulence, and, by subinoculation, soon become stabilized. Strain M became stabilized soon after the sixth passage.

" (2) *T. gambiense* is much more difficult to establish in rats. Strains H2 and J took months to show in the peripheral blood of the original rats.

" (3) *T. gambiense* may become rapidly virulent to rats (*cf.* Strain H, which soon became stabilized, eventually killing rats in three days) ; on the other hand, it may become even less virulent by passage, as in the case of Strain H2, in which the twentieth, twenty-first and twenty-second animals lived well over a year each.

" (4) The variations in virulence of the three strains (Strains H2, J and MA) of *T. gambiense* followed a similar curve. First there was a sharp rise to the third and fourth passages, then a drop at the fifth and sixth. At the seventh or eighth passage there was a quick rise in virulence, which was maintained for about five passages, i.e., up to the thirteenth. Thereafter the fall in virulence was gradual until the nineteenth passage, when there was divergence.

" (5) Two strains of *T. gambiense*, isolated at an interval of nearly two years from the same human case, showed marked variation in their virulence. The first to be isolated (Strain H) became rapidly stabilized, and in two years was killing rats in three days ; the second (Strain H2) finally became less virulent, the last three animals all surviving for more than a year.

" (6) This discrepancy in the relative virulence of these two strains (H and H2) possibly is due either to the difference of the lengths of time they inhabited the human host, or to the treatment which the patient H had received in the interval before the second strain was isolated.

" (7) *T. gambiense* may exhibit a peculiar latency, lying dormant, as it were, in subinoculated rats. This latency has been compared with 'cryptic' trypanosomiasis. For example, two rats inoculated with Strain J showed trypanosomes in their blood on one occasion sixteen days after inoculation, and did not show again for about five months. A similar latency may be observed in human cases as a result of drug treatment. When rats carrying the virulent, stabilized Strain M are treated with drugs, especially the arsenicals, the trypanosomiasis similarly may be dormant.

" (8) By mechanical transmission a strain of trypanosomes, maintained in a series of hosts of the same species, *usually* will exhibit increased virulence ; on the other hand, the virulence may actually decrease, as in Strain H2, *T. gambiense*. By passage through a host of a species different from the usual, the virulence of a strain may be markedly modified, either diminished or increased.

" (9) It is suggested that in trypanosomiasis, among other actions, drugs may change the character of a host. Further, that such alteration in the host almost may be comparable to that obtained by injecting organisms from a host of the species in which the strain is usually mechanically maintained into a host of another species. This is exemplified in the patient H. Before treatment the organisms isolated from his blood were very virulent ; after treatment they became very avirulent to the rats. In rats carrying *T. gambiense* (Strain MA) which were treated with halarsol, the strain rapidly became much more virulent during subsequent passages.

" (10) When either *T. gambiense* or *T. rhodesiense* are transferred mechanically from man to rats, at first the trypanosomes exhibit a well-marked polymorphism, with, in the case of the latter, the appearance of posterior-nuclear forms, but later this is lost. Up to a certain stage the polymorphic nature of the parasites can be made to return by transferring the strain from the usual host into a host of another species.

" (11) A return of the polymorphism and, in the case of *T. rhodesiense* posterior-nuclear forms, can be brought about by the action of drugs. The suggestion is that the return to the polymorphic character is not due so much to the action of the drug on the parasites as on the host."

W. Y.

ROBINSON (E. M.). **Serological Investigations into some Diseases of Domesticated Animals in South Africa caused by Trypanosomes.**— *11th & 12th Reports Director Vet. Education & Res.* Dept. of Agric. Union of S. Africa. Part I. 1926. Sept. pp. 9–25. 5 refs.]

Originally the intention was simply to apply the complement fixation test in the diagnosis of dourine in horses, but opportunity occurred of examining the reaction also in the diagnosis of nagana in cattle and other animals. The results obtained were of considerable value, as the animals in the nagana experiments were all inoculated with pure strains of either *T. congolense* or *T. brucei*. In addition to the complement fixation test, the Sachs Georgi and Meinicke lipoid fixation reactions were tried both in dourine and nagana.

The complement fixation test.

The technique employed for obtaining the antigen and for carrying out the complement fixation test is described in detail and is essentially the same as that devised by WATSON in Canada (1920). It was ound :—

1. The complement fixation test may be used for the diagnosis of dourine occurring naturally in South Africa, provided *T. equiperdum* antigen is employed.

2. Animals infected with *T. brucei* react to the complement fixation test when *T. equiperdum* antigen is used.

3. Animals suffering from a pure *T. congolense* infection do not usually react when *T. equiperdum* antigen is used, though in rare cases a partial reaction may be obtained. In Table 2 it will be observed that cattle 317 and 101 each on one occasion reacted strongly. That this was exceptional is shown by the series of reactions in Table 5.

4. There is some evidence to show that sera obtained from animals with pure *T. congolense* infections may give marked reactions with *T. congolense* antigen. The sera of animals infected with *T. equiperdum* react slightly or not at all to this antigen.

5. The sera of a number of cattle showing pure infections with *T. vivax* did not give reactions to the complement fixation test using *T. equiperdum* antigen.

The Sachs Georgi test.

The technique employed for this test was the modification introduced by DREYER (1921). It was found that certain sera of nagana cattle gave quite marked reactions, but others none at all. A large number of dourine sera were tested, and in addition sera of rabbits and guineapigs infected with dourine and nagana, but the results were uniformly negative. With horse sera, whether from dourine or nagana cases, no trace of a reaction was obtained.

The Meinicke lipoid fixation reaction.

The technique employed was that of DAHMEN (1920). The results, which are set forth in a table, show that animals infected with *T. equiperdum* usually gave a strongly positive reaction with this test. Antigen made from dourine trypanosomes was used for the whole series. Animals infected with *T. congolense* might or might not react positively, but most of those infected with *T. brucei* gave positive reactions. The lipoid fixation reactions appears to be less specific than the complement fixation test ; whether it is more reliable for dourine than the latter, as is claimed by DAHMEN, cannot yet be regarded as certain.

W. Y.

KUDICKE (R.) & COLLIER (W. A.). Intrakutane Superinfektionsversuche an tsetsekranken Kaninchen mit Trypanosomen der gleichen Art. [**Intracutaneous Superinfection Experiments on Nagana Rabbits with Trypanosomes of the same Species.**] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Sept. 11. Vol. 29. No. 9. pp. 407–421. [7 refs.]

In these experiments the authors wished to ascertain how the skin of nagana rabbits reacted on intracutaneous injections of living trypanosomes of the same species; they further wished to find out whether there was any evidence that an alteration in the skin reaction stood in relationship to the formation of immune body, and finally they desired to obtain information regarding the destiny of parasites used for superinfection, especially when the cutaneous reaction was absent or in any way changed.

The authors used in their work three nagana strains, viz.: Strain B, nagana "ferox" of Ehrlich; Strain B1, from the Robert Koch Institut, and Strain T, which had been rendered blepharoplastless through acridin dyes. Strains B and T behaved differently to various drugs; Strain B was susceptible to arsenicals and to other drugs, but Strain T was resistant to arsenicals and also to trypaflavin and similar dyes. Further information regarding the three strains is also given.

The course of the infection in rabbits is described fully by RITZ and STÜHMER. On intravenous injection after an onset of 3 or 4 days there follows a negative period during which trypanosomes are absent from the blood, then they reappear and remain until the animal's death. During the whole period, however, the parasites are scanty, except before death, when they are more numerous. In the relapse periods the trypanosomes in the blood exhibit numerous modifications whereby they are distinguished from the "primary strain" and from one another by their antigen behaviour. On intracutaneous inoculation the parasites multiply *in situ* for three days, and then, coinciding with the development of the primary signs, e.g., local gland swelling, they appear in the blood. On about the seventh day they disappear from the blood and the local signs subside; on the ninth day the relapse period begins and is accompanied by the development of the secondary signs. Up to the sixth day the trypanosomes from the primary lesions, the glands and the blood have the character of the primary strain. STÜHMER, who studied the subject in detail, found no antibody in the blood on the fourth day, small amounts on the eighth day and full formation on the thirteenth day.

In the authors' experiments the course of the infection was in most respects identical with the above, but showed some deviations; whether these were due to technique or to the strains used is unknown. The authors always made their intracutaneous inoculations in the back, as they had to use female animals. For their purpose the time of the appearance of the local reaction, its intensity and duration are of importance. The lesions produced by the strains and the blood infections are described in detail.

The results of intracutaneous superinfection with the homologous strain of rabbits previously infected by the intracutaneous method are summarized in a table. It is seen that the normally strong local reaction occurs up to the 28th day, that in the later periods of artificially prolonged infection (through small doses of arsenophenylglycin) the local reaction very frequently fails or is quite transient, that such is the case, however, sometimes much earlier, and that at times reactions occur which are of only moderate intensity or are greatly delayed. Weak or failing reactions were more common with the blepharoplastless strain T than with the normal strain B, and this is explained on the grounds of the greater dermatotropism and arsenic susceptibility of the latter strain. Trypanosomes were always

found at the place of superinfection, usually in the customary number when the local lesion was well-developed. When the local superinfected lesion was feeble, trypanosomes were either not found at all or only in much smaller numbers than normal. The later the superinfection the fewer positive results were obtained by puncture of the site.

In a second table are summarized the results of intracutaneous superinfection with heterologous strains of previously intracutaneously infected rabbits. In the great majority of cases a marked local reaction occurred. The heterologous strain was always seen in the local lesion and in the blood stream, where it was found either mingling with the primary strain or alternating with it. The number of trypanosomes in the place of superinfection was, as a rule, less than that in a normal lesion, but higher than that found in superinfection of the homologous strain.

In the third table are given the results obtained by intracutaneous superinfection with homologous and heterologous strains in previously intracutaneously infected rabbits. In these cases the primary infection was, as a rule, prolonged by treatment, and between the 61st and 150th days the animals were superinfected in different places with the homologous and heterologous strains. In 6 of the 9 experiments the primary infection was the blepharoplastless strain T and in the remaining 3 the normal strain. In the majority of the heterologous superinfection places the reaction was well marked, whereas the homologous lesions were all moderate or feeble. The authors believe that the simultaneous superinfection with the heterologous strain so alters the condition of the animal that the homologous strain more readily produces a reaction. The number of parasites found in both lesions was less than in the control animals, and as might be expected greater with the normal strain than with the blepharoplastless strain. In the blood the heterologous strain was always found ; the newly introduced homologous strain appeared to be inhibited.

From these experiments it appears that the homologous strain both at the site of superinfection and also in the blood is inhibited, and this is the more marked the later the superinfection is made. The longer the primary infection runs the more antigen is formed. The heterologous strains meet with less opposition than the homologous, as its chief antigen is different, and hardly ever is the inhibition so strong that the local reaction fails, whilst the absence of the heterologous strain from the blood never occurs.

In the uninfluenced tsetse infection of rabbits exhaustion of antibody formation occurs relatively early, as a rule, and this is signalized by a sudden swarming of the parasite in the blood. On this exhaustion of antibody depend in part at least certain of the anomalies observed in the authors' experiments.

Certain observations in the authors' experiments suggest that the skin has a unique position in the immunization processes. A series of experiments was performed in which the primary infection was given not intracutaneously, but intravenously. Stühmer has shown that the chancre formation failed in animals which had previously been given the same strain intravenously and also when the intracutaneous and intravenous inoculations were made at the same time. The latter observation was not re-examined, but the authors' experiments substantially confirm the former.

Two rather considerable series of experiments of a similar nature were performed with heterologous strains ; the blepharoplastless strain T serving for intravenous injections and the normal strain B for intracutaneous infection. The two series of experiments were distinguished by the number of trypanosomes injected intravenously, in the one it was about 100 times greater than in the other. In the first series the results were quite definite—only one animal reacted in the usual manner, one in a modified form, one not at all, and the remainder in a transient manner. It follows, therefore, that heavy intravenous infection almost always exerts

a very considerable inhibitory action even on the cutaneous reactions with the heterologous strain. In the second series the results were not so simple; five or six normal or almost normal cutaneous reactions were obtained, one modified reaction, two greatly delayed and two quite transient. In both series the interval between intravenous and intracutaneous infections was quite small. In both series of experiments as many trypanosomes were found in punctures of the superinfection site of animals with good reactions as in the controls: and even in those cases in which the reaction was slight the number of parasites found was not much diminished, and finally sometimes even when the reaction failed puncture of the superinfection site revealed the presence of many parasites.

Examination of the number of trypanosomes in the peripheral blood of the animals comprising these series showed that of ten with greatly modified skin reactions nine exhibited definitely more parasites in the blood than normally. In contrast, of 23 with marked reactions 18 showed a decrease, 4 a moderate increase, and only one a great increase of the number of parasites in the blood. Furthermore, in those animals in which there was only a quite transient cutaneous reaction, the heterologous strain used for superinfection was always found in the blood, whereas in the control animals examined at the same period the blood was often negative. Apparently, therefore, the heterologous intracutaneously inoculated trypanosome meets with less opposition in the blood of previously intravenously infected animals than in that of normal animals. The better the cutaneous reaction, the better the animal deals with the double infection: of the rabbits intravenously infected and later superinfected with the heterologous strain those which exhibited slight or no cutaneous reaction lived on an average 19·5 days, whereas those with marked reaction lived 31·8 days.

These experiments suggest that it is the immune processes resulting from the intravenous infection which prevent the cutaneous reaction and that when the intravenous infection is great the immune body influences also the heterologous strain. But against this is the fact that inhibition in the blood itself is not found, as is also the observation that in such animals as had a particularly heavy blood infection the cutaneous reaction was slight Possibly the skin plays a special rôle in the formation of immune body and this process is independent of the rest of the organism. The fact, however, that in certain animals, even when superinfected with a homologous strain, trypanosomes were multiplying at the site of superinfection, although no reaction was visible for a long period, indicates that the cause of the absence of reaction is not to be sought in the immunity process, but in the infection process. The authors believe that the cutaneous reaction in Stühmer's experiments failed because the infection led to an alteration in the condition of the reacting cell systems, and they consider it probable that there is a change in their reaction capacity.

If this view be correct, two different processes operate in influencing the cutaneous reaction in superinfected animals: on the one hand, the specifically enriched immunization process, which influences the parasite and thereby limits the irritation, which consequently is only fully-developed after the disease has lasted sometime; and, on the other hand, the infection process itself which acts on the cells concerned in the inflammation. It is to be remarked that the latter process is active not only at the beginning of the infection, but also in later periods.

W. Y.

1. Kritchevsky (I.) & Autonomov (V.). Ueber Superinfection bei nichtsterilisierender Immunität. [**On Superinfection in Non-Sterilizing Immunity.**]—*Arb. a. d. Microbiol. Inst. d. Volksuntervichtskomissariats.* 1926. Vol. 2. German summary p. 35. [In Russian, pp. 23–34. Refs. in footnotes.]

ii. KRITSCHEWSKI (J. L.) & HERONIMUS (E. S.). Weitere Studien ueber die Frage der nichtsterilen Immunität and der Superinfektion bei Trypanosomiasis. [**Further Studies on the Question of non-Sterile Immunity and Superinfection in Trypanosomiasis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Mar. Vol. 31. No. 3. pp. 126–133. [3 refs.] Also in Russian in *Arb. a. d. Microbiol. Inst. d. Volksunterrichtskomissariats.* 1926. Vol. 2. pp.142–152. [2 refs.] German summary p. 152.

i. The authors have shown that infection with *T. brucei* results in a non-sterile immunity, in respect of the same species and same strain of trypanosomes, in only a few animals. In the majority it fails, and one can produce superinfection in the infected animal.

The conclusions are :—

1. In experimental infection of the mouse with *T. brucei*, the so-called non-sterile immunity is not seen, or is found only exceptionally.
2. Consequently, superinfection with the same strain of species succeeds as a rule in the mouse.
3. In certain cases, however, superinfection fails and in such one must consider these animals as being in a condition of non-sterile immunity.
4. Superinfection may succeed in an animal more than once ; the absent non-sterile immunity may then in a given animal finally appear.

ii. The following conclusions are reached :—

1. Superinfection of animals infected with *T. brucei* or *T. equiperdum* can succeed not only with strains of the same species, which differ from the strain with which the organism was originally infected, but also with the identical strain.
2. Non-sterile immunity may or may not be present, independently of whether the strain used for the second infection is or is not identical with that used for the first.
3. The presence or absence of antibody is not related to the possibility or impossibility of producing superinfection of the infected animal.

W. Y.

STÜHMER (A.). Weitere Beiträge zur Kenntnis der Trypanosomenerkrankung des Kaninchens als Modellinfektion für Syphilis. (Fieberverlauf.–Serum–reaktion.– Seronegative und sero-positive Sekundärperiode.–Erreger im Hodengewebe.–Immunschwäche des Zentralnervensystems.) [**Further Contributions to Knowledge of Trypanosome Disease of Rabbits as a Model Infection for Syphilis.**] —*Arch. f. Dermat. u. Syph.* 1926. Dec. 31. Vol. 152. No. 3. pp. 738–750. With 12 text figs.

In view of the difficulties and expense attending experimental work on syphilis in rabbits, the author has studied trypanosomiasis in this animal as a paradigm of human syphilis. In his earlier experiments, he used nagana infection, but later dourine was employed, because in several respects this infection simulated syphilis still more closely. Whilst after local infection the course of the disease and the time of development were very similar in the two infections, yet the primary lesion in dourine was drier with an inclination to scab formation, whereas that in nagana was softer and more haemorrhagic.

On intracutaneous inoculation of the scrotum there was, as a rule, no change observable during the first three days, but from the third day onwards, the parasite appeared in the blood stream—the primary strain (primärer Ausgangsstamm). At the same time the local primary lesion

developed with local glandular enlargement. From the fourth day onwards there was a gradually increasing development of antibody against the primary strain in the blood, so that in the course of six or seven days the parasites gradually disappeared from the blood and had gone by the eighth day. On the ninth day, parasites again commenced to appear in the blood and these were not susceptible to the antibody—serum-fast relapse strain (serumfester Rezidivstamm). Some days later—usually on the thirteenth or fourteenth day—the secondary appearances, such as skin changes, swelling of the genitals, eyelids, nares and ears, manifested themselves. Corresponding to the course of the rising antibody curve is the falling off of the superinfection, which is strongly positive on the fourth day, only weakly positive on the eighth day and on the thirteenth day simultaneously with the development of the secondary appearance is negative: "Anergie" is thus reached. The biological boundary between the primary and secondary stages of the disease is thus seen to occur on the eighth day, whereas the clinical symptoms of the secondary stage are not observable until the thirteenth or fourteenth day.

It was found that in the therapeutic sense a very important difference existed between the first and second stages of the disease. In the primary stage the "dosis sterilisans" of salvarsan was 5 mgm. per kilo. of body weight, whereas in the well-developed secondary stage the amount was 30 mgm.

Study of the temperature charts of 13 dourine locally infected rabbits showed a sharp rise of temperature on the fifth and sixth days, and then an equally sharp fall, followed on the eleventh or twelfth day by a further rise. It is thus seen that the temperature movements indicate the division on the eighth and ninth days between the two stages of the disease.

After considerable work, the author succeeded in elaborating a technique for performing the Wassermann test on rabbits infected with trypanosomiasis. It was found that normal rabbits always gave a negative reaction, whereas those showing pronounced secondary signs always reacted positively. Five animals locally infected were then examined regularly through the course of the disease and it was found that they gave negative reactions until the eleventh or twelfth day and from the thirteenth or fourteenth day they always gave positive reactions.

The author then proceeded to investigate whether the appearance of trypanosomes in the blood was accompanied by a penetration into the tissues. It was regularly found that in rabbits which were inoculated with *T. equiperdum* intracutaneously on the left scrotum parasites were to be found in the testicular substance not only in the second stage of the disease, but also in the first. Details of one case are given: in this animal trypanosomes were found in numbers in the right testicle on the fifth and sixth days, then corresponding to their disappearance from the blood they were absent from the testicle until the twelfth day, when they reappeared once more both in the blood and testicles. Experiments showed that the strain obtained from the right testicle during the fifth and sixth days before any obvious changes had occurred in the testicles corresponded with the primary strain from the blood, in that both were sensitive to the action of the immune serum, in contrast to the serum fast relapse strain obtained from the blood during the secondary period.

Applying these analogies to human syphilis he sums up the process of the latter disease as follows:—

Primary effect, regional gland swelling, blood invasion of the primary causal agent and elective multiplication of this in especially susceptible tissues (testicles). After the critical days there follows first a sero-negative period which in turn is followed, after the appearance of the tissue reaction, by a sero-positive secondary period.

The fact that the causal agent can settle down in the body tissues in the primary stage of the infection gave the author the idea that possibly also the central nervous system may be a tissue in which the parasite can settle in the primary stage. As a working hypothesis, the author assumes

that the nervous system is invaded before the first secondary appearances, and that then a branching out of both processes takes place. On the one hand, the body infection continues with its cutaneous manifestations and manifold relapses, and on the other the nervous infection goes on its own way. Numerous relapses with marked tissue reaction and corresponding strong immune body formation must exert some influence on the nervous infection. One can assume that under such conditions the nervous infection is inhibited, whilst on the contrary a speedy disappearance of the body infection may be favourable to the development of the nervous infection. Experience suggests that it is the mild syphilis which leads to tabes and general paralysis, whereas syphilis with numerous and severe cutaneous lesions does not result in nervous disease.

The author has succeeded in isolating and maintaining the parasite from the nervous system and found its virulence distinctly lessened; in inoculating it back from rats to rabbits, it appeared to have the elective property of again seeking out the nervous system. It is probable that in the nervous system the organism finds quite special conditions of life. In the spinal fluid of rabbits, which as the result of severe secondary symptoms developed in their blood powerful immune body against the primary strain, no trace of immune body was found.

W. Y.

Savino (E.). Rélation entre le nombre des trypanosomes et les variations glycémiques dans l'infection expérimentale par *Trypanosoma equiperdum*. [**Relation between Number of Trypanosomes and Glycaemic Variations in Experimental** *T. equiperdum* **Infection.**]—*C. R. Soc. Biol.* 1927. Jan. 28. Vol. 96. No. 3. pp. 220–221.]

This work was suggested by the observations of Schern. Dogs were inoculated with a very active strain of *T. equiperdum* and the variations in the number of trypanosomes in the peripheral blood was observed under the following circumstances—(1) During the action of insulin, and (2) under the influence of an injection of glucose and insulin, or of glucose alone. The author has also examined the sensitivity of the infected dogs in regard to insulin, and finally he has endeavoured to establish a relationship between the glycaemia and the number of trypanosomes in the blood in the course of the infection.

It was found that an injection of insulin causes a diminution of glucose, and also in the number of trypanosomes. This decrease depends only on the hypoglycaemia, because a simultaneous injection of glucose and insulin results in a slight diminution or increase in the number of trypanosomes, according to the variations in the glycaemia. An injection of glucose alone is followed by an increase in the trypanosomes. The glycaemia diminishes less in infected dogs than in the controls; but the value of the glycaemia during the course of the infection does not remain in relationship to the number of trypanosomes in the peripheral blood.

W. Y.

Dubois (A.). Le phénomène de Kurt Schern dans les trypanosomiases. [**Kurt Schern's Phenomenon in Trypanosomiasis.**]—*C. R. Soc. Biol.* 1926. Nov. 5. Vol. 95. No. 31. pp. 1130-1133. [2 refs.]

The author has re-examined the phenomenon described by Schern [this *Bulletin*, Vol. 23, p. 428], and has reached the following conclusions :—

1. The pathogenic trypanosomes of mammals are paralysed when deprived of sugar, *in vitro*. This paralysis is easily curable—provided it is not of too long duration—by the addition of glucose, laevulose, or in less degree by maltose and galactose. Glycerine has the same favourable action.
2. As Schern has shown, the lability of the trypanosomes is dependent upon the failure of sugar and is of prognostic value ; it becomes the more marked the nearer the host is to death.

W. Y.

Dubois (A.) & Bouckaert (J. P.) L'hypoglycémie au cours des trypanosomiases expérimentales à *Trypanosoma brucei*. [**Hypoglycaemia in the Course of Experimental *T. brucei* Infection.**] —*C. R. Soc. Biol.* 1927. Feb. 18. Vol. 96. No. 6. pp. 431–433. [1 ref.]

In this work the authors have studied the carbohydrate metabolism in the course of experimental infection of animals with *T. brucei ugandae* The conclusions are :—

1. In the course of infection with trypanosomes there is a notable hypoglycaemia, chemically detectable, in the animal.
2. The physiological mechanism of this hypoglycaemia demands further research.
3. The rôle of the phenomenon in question in the clinical phenomena is either nil or very limited.

W. Y.

Dwijkoff (P.). Zur pathologischen Anatomie und Morphologie des Blutes einer experimental Trypanosomiasis bei Meerschweinchen. [**The Pathological Anatomy and Morphology of the Blood in Guineapigs Experimentally Infected with Trypanosomes.**] —*Folia Haematologica.* 1. Teil : Archiv. 1926. Sept. Vol. 33. No. 1. pp. 1–5. [21 refs.]

In this work the author has endeavoured on the one hand to obtain more precise information regarding the histological changes occurring in the bone-marrow, spleen and blood in experimental trypanosomiasis, and on the other hand to investigate the correlation of the activity of the haematopoietic organs—the marrow, spleen and lymph-glands—and the condition of the peripheral blood.

Thirteen guineapigs were inoculated subcutaneously with 1 cc. of nagana blood, and one with 1 cc. of blood from an animal infected with the camel trypanosome of Turkestan. The nagana guineapigs steadily lost weight until death occurred after periods varying from one to six weeks ; the animal inoculated with the camel trypanosome lived four months. The whole organism was emaciated and cachectic, and the adipose tissue had disappeared. There existed pronounced hyperaemia of the peritoneum and in most cases a haemorrhagic exudate in the abdominal cavity. Punctate haemorrhages were found in the peritoneum and diaphragm, in the gastric mucosa, in the pericardium, pleura and lymph glands. In the brain, lungs, liver and intestine there was passive hyperaemia. The changes in the lymphatic system were striking. The spleen was, as a rule, three or four times the normal size ; it was soft and the follicles stood out plainly, giving the appearance of a septic organ. All the lymph glands, especially the inguinal glands, were enlarged and in places exhibited central necrosis. The lymph vessels between the glands were changed into thick yellow cords. The heart, liver and kidneys exhibited parenchymatous degeneration. These macroscopic appearances gave the impression that

one had to do with a wasting disease with a strongly pronounced reaction of the lymphatic apparatus, reminding one of a chronic sepsis.

Turning to the histological changes it was found that the striking macroscopic appearances of the lymphatic apparatus corresponded to microscopic alterations. In the spleen and lymph glands there was marked hyperplasia. Although the follicles were enlarged, there were no corresponding masses of lymphocytes; their centres had a clearer appearance since the reticular cells were strikingly enlarged and swollen and their intermingling with the lymphocytes gave the impression of a vacuolization of the follicle. The reticular cells had a large diffuse nucleus which appeared sometimes to be fragmented and reminded one of the giant cells of the marrow—the megakaryocytes. The lymph cells in the follicles showed changes, they were increased in size, their protoplasmic zone was broadened and their nuclei were clearer. In other words the changes characteristic of the so-called myeloid metaplasia were observed. In certain cases of longer duration the cells of the periphery of the follicle became lengthened and the follicle became fibrosed. The appearances of the bone marrow were marked hyperaemia, pronounced leucopoiesis, a mass of myelocytes, metamyelocytes and especially of eosinophil myelocytes. Giant cells, megakaryocytes, were very numerous; they were adherent to the vessel cells and showed evidence of nuclear degeneration. It is interesting to compare these changes with those of the peripheral blood. Blood counts showed neutrophils 7–12 per cent. and lymphocytes 80–92 per cent.; eosinophils were practically absent, as were also myelocytes and metamyelocytes. The appearance of the central haematopoietic organs hence did not correspond with those of the blood. No definite change was observed in the number of basophil leucocytes in the peripheral blood. The lymphocyte group was interesting: in general the small lymphocytes predominated, but at times the moderate-sized and large lymphocytes were present in considerable numbers (10–15 per cent.). Sometimes amongst these lymphoid group cells were encountered in numbers (up to 12 per cent.) which reminded one of micro- and meso- myeloblasts; they were distinguished from myeloblasts by their coarser nuclear structure. It is difficult to imagine that in the peripheral blood myeloblasts are present and that their subsequent developmental stages, myelocytes and metamyelocytes, are absent since so many of these are found in the bone marrow. These cells do not arise in the marrow, but in the centre of follicles of the lymphatics where such peculiar changes occur in them. They do not travel from the marrow to the peripheral blood, but the lymphatic system endeavours to restore the balance by assuming the function of the marrow and producing these cells, which resemble myeloblasts. The effort to assume the function of the marrow is further seen in the new formation of the reticular cells of the follicles which resemble megakaryocytes.

Leucocytosis was never observed, the large mononuclears never exceeding 6 per cent. The observations of certain previous observers on this point are erroneous, the mistake apparently arising from an enumeration of large lymphocytes. Nor is an increase in the large mononuclears to be expected since there is in trypanosomiasis no reaction of the reticulo-endothelial apparatus of the liver.

The author regards trypanosomiasis as a sort of sepsis which influences especially the blood forming organs and particularly limits the functions of the marrow. The lymphatic system reacts through hyperplasia and attempts to support the failing function of the marrow. True mononuclear leucocytosis is completely absent.

W. Y.

Battaglia (Mario). L'edema nelle infezioni da tripanosomi. [**Oedema in Trypanosome Infections.**]—*Pathologica.* 1927. Feb. 15. Vol. 19. No. 424. pp. 64–65. [8 refs.]

In experimental infections by trypanosomes the author examined the thyroids and parathyroids of animals showing oedema, some of them early,

others later. In the former the thyroid was firm and surrounded by myxomatous tissue, in the latter the gland was also firm but reduced in size. The cells enclosing the follicles showed pyknosis and karyorrhexis, with vacuolated protoplasm, while the parathyroids were reduced to an "amorphous" state. He regards the oedema of trypanosomiasis as allied to myxoedema associated with a degenerative inflammation of the thyroid and parathyroid, and hypothecates similar involvement of other endocrine glands in sleeping sickness.

H. Harold Scott.

Bruni (N.). Observations et recherches sur *Trypanosoma lewisi* et *Schizotrypanum cruzi*. [**Observations on** *T. lewisi* **and** *T. cruzi*.] —*Bull. Soc. Path. Exot.* 1926. Nov. 10. Vol. 19. No. 9. pp. 791–794. [2 refs.]

This paper records a number of isolated observations on *T. lewisi* and *T. cruzi*.

Of 103 rats (*Mus decumanus*) captured in the military hospital of Bologne 56 were infected with *T. lewisi*. The infection was not found to be more frequent in summer than in winter, but it appears to be of unequal distribution, *e.g.* in one building 90 per cent. of the rats were infected, whilst in another in the same hospital very few were infected. A female rat with a very heavy infection gave birth to three young ones, none of which was infected. No evidence of disease was discovered in two naturally infected rats kept in captivity for 6 weeks and 6 months, respectively. Four white rats placed in the same cage did not become infected, although the naturally infected animals were infested with lice and fleas. White rats were fed on infected organs, and did not become infected, but white rats inoculated with the trypanosome developed an infection which killed them in about a month.

Ectoparasites were not very common on the naturally infected animals. The fleas were *Ceratophyllus fasciatus* and the lice *Hematopinus spinulosus*; flagellates were never discovered in their guts.

At the same time a number of similar observations were made on *T. cruzi*. Two pregnant guineapigs were inoculated and 16 days later aborted; although parasites were plentiful in the blood of the parents the offspring were negative. Twelve mice (*Mus musculus* var. *albus*) were inoculated and died within three days; in view of this susceptibility mice were fed on infected organs, but without result. Attempts to infect cold-blooded animals, *e.g.* frogs and toads, did not succeed.

W. Y.

Taliaferro (William H.) & Johnson (Thurston L.). **Zone Phenomena in** *in vivo* **Trypanolysis and the Therapeutic Value of Trypanolytic Sera.**—*Jl. Preventive Med.* Chicago. 1926. Sept. Vol. 1. No. 1. pp. 85–123. With 1 text fig. [29 refs.]

In various *in vitro* serological titrations, it is a common occurrence to meet with "zones of inhibition" or Neisser-Wechsberg phenomena. These zones were discovered by Neisser and Wechsberg (1901) who, during the estimation of the bactericidal property of immune sera, made the observation that in the presence of a constant amount of complement and antigen (*Vibrio metchnikovi*) medium amounts of antiserum were completely bactericidal, whereas very large amounts of antiserum were no more bactericidal than small amounts. Thus paradoxically, they found that while medium doses were bactericidal, large doses of immune serum prevented the bactericidal action of the antibody.

The object of the present work is to show that " zones of inhibition " occur in *in vivo* trypanolysis ; that is, if different sized doses of lytic sera are given to a series of mice previously infected with a pathogenic trypanosome, the medium sized doses will often produce lysis of the trypanosomes, whereas larger doses will cause no observable parasiticidal effects.

The methods of obtaining *in vivo* trypanolysis are described in detail ; then, following data on the zone phenomenon with immune sera, several experiments are presented on the *in vivo* demonstration of trypanocidal property of normal human serum in which " zones of inhibition " were never observed.

The following conclusions of this long and rather technical paper are given :—

" 1. Serum taken from guineapigs or rabbits after infection with *T. equinum* and after the first trypanolytic crisis or from infected sheep during the chronic infection will often produce a trypanolytic crisis in mice previously infected with the passage strain. The length of life of such treated mice is prolonged over that of untreated mice approximately the same number of days that the artificial crisis lasts.

" 2. In mice infected with the passage strain and given a series of increasing doses of immune serum some doses will often produce a crisis while larger doses are not effective. There may be several recurring ' zones of inhibition ' of lytic function within a single series.

" 3. Zonal phenomena are not dependent upon inactivation. They occur with trypanolytic sera arising during the uninfluenced course of infections in guineapigs, rabbits and sheep and in infected mice after treatment.

" 4. Zonal phenomena were observed in neither fresh nor inactivated normal human serum, which is markedly trypanocidal *in vivo*.

" 5. The therapeutic value of immune trypanolytic serum, as measured by length of life of the mice, is dependent upon the occurrence of trypanolysis and not upon the size of the dose. Thus, when trypanolysis is inhibited in a larger dose, length of life is not increased over the control, whereas in smaller doses with trypanolysis, it is increased. Furthermore, the increase in length of life is approximately the same whether the crisis was brought about by a small or a large dose of immune serum."

W. Y.

Jaffé (R. H.) & Brown (S.). **The Influence of Malaria Chills on the Trypanocidal Action of the Serum.**—*Proc. Soc. Experim. Biol. & Med.* 1927. Jan. Vol. 24. No. 4. pp. 344–347. With 1 text fig. [16 refs.]

The malaria treatment of general paralysis afforded an opportunity of studying the effect of malaria chills on the trypanocidal action of the serum. *Trypanosoma equiperdum* obtained from Taliaferro was the parasite used and the blood of 5 patients was tested before, during and after the malarial paroxysms. It was found that during the malaria chills the trypanocidal power of the serum was distinctly diminished ; the decrease was most pronounced shortly after the temperature had returned to normal, but before the next chill starts the normal titre is restored.

W. Y.

i. Werner (O.) & Hartmann (E.). Untersuchungen ueber die trypanociden Serumsubstanzen bei Hämophilie. [**Investigations on the Trypanocidal Serum Substance in Haemophilia.**]—*Med. Klin.* 1926. Nov. 19. Vol. 22. No. 47 (1145). pp. 1803–1804. [5 refs.]

ii. Leichtentritt & Opitz. Untersuchungen ueber die trypanoziden Serumsubstanzen bei Hämophilie. Bermerkungen zu der gleichnamigen Arbeit von Werner und Hartmann in der M.Kl. 1926, Nr.47, S.1803. [**Remarks on the Work of Werner and Hartmann.**] *Med. Klin.* 1927. Jan. 14. Vol. 23. No. 2 (1153). pp. 59–60. [2 refs.]

i. After referring to the work of Rosenthal and his collaborators (this *Bulletin*, Vol. 22, p. 143, etc.) on the absence or deficiency of the trypanocidal substance from the serum in various conditions associated with grave parenchymatous disease of the liver, and to that of other investigators on similar lines, the authors turn to the observations of Opitz and Zweig. These workers noticed in three cases of haemophilia a disappearance of the trypanocidal substance from the serum and furthermore that a definite parallelism exists between this and the stage of the disease. Whilst in the stage of marked bleeding the trypanocidal action of the serum was normal; when the bleeding had ceased the trypanocidal action was no longer discernible. The observation by these authors that in the mother and sister of these patients also the trypanocidal substance was absent from the serum is very striking. These findings suggest that possibly the liver participates in the mechanism of production of haemophilia. Clinically, however, in haemophilia there is no disturbance of liver function and the investigations of Rosenthal have indicated that the trypanocidal power of the serum in adults is only lost in severe parenchymatous disease of the liver.

The authors considered that it would be of great interest to repeat these observations and they did so in four cases of haemophilia. In neither the serum nor plasma of any of these cases did the authors detect a disappearance of the trypanocidal substance, or, in fact, any decrease in its amount. The same applied to the relations of these patients.

ii. This paper is a rejoinder to that of Werner and Hartmann. The authors state that the fact that Werner and Hartmann found no serological deviation from the normal in four cases of true haemophilia is merely a confirmation of their own communication that exceptions to the rule occur. They themselves have recently encountered a case of sporadic haemophilia in which the serum possessed trypanocidal properties: this was a child with normal red cell count and haemoglobin who for a considerable time had had no marked haemorrhage. Witkower had recorded a somewhat similar case in which the serum was trypanocidal after a severe haemorrhage, but unfortunately further examination after blood regeneration had occurred was not made. The stage of the disease seems to be of importance and as Werner and Hartmann say nothing about their cases a critical analysis is impossible.

Through the kindness of Professor Kleinschmidt (Hamburg) Leichtentritt has had the opportunity of investigating yet another haemophiliae family. There were 44 examinations made on 30 family members of 6 different bleeder stocks. Seven manifest haemophiliacs possessed no trypanocidal properties in their serum and 1 did, but he was only examined once. Of the 19 non-bleeder relations—male and female—18 lacked the trypanocidal body. The authors consider that the data are now sufficiently large to attribute some significance to the absence of the trypanocidal substances in haemophiliacs.

W. Y.

Bedford (G. A. H.). **Report on the Transmission of Nagana in the Ntabanana and Mhlatuze Settlements, Zululand.**—*11th & 12th Reports Director Vet. Education & Res.* Dept. of Agric. Union of S. Africa. Part I. 1926. Sept. pp. 275–300. [2 refs.]

The report is based on a survey of the blood-sucking insects to be found in the western section of the Lower Umfolosi division of Zululand;

the observations were made between October, 1922, and May, 1923. The area in question may be described as that strip of country which extends from the Mhlatuze river on the south to the White Umfolosi river on the north; it lies immediately east of the open highlands of the Melmoth district and west of the equally open sugar-cane belt. The belt is roughly 300 square miles in extent; it comprises about 100 farms, of which a few, less than 20 in the south-east corner, were allotted in 1912 and the remainder in 1918–1920. The settled portion is bounded on the north by a strip of Crown land some 10 miles in depth, which extends along the south bank of the White Mfolosi river. This strip is known as "Shooting Area No. 11," it is one of the extensions of the immense game reserve that lies in the angle formed by the White and Black branches of the Mfolosi.

The greater portion of the new settled area was opened up in 1919–20 to "returned" soldiers who had served in the Great War: prior to this it was practically unoccupied, being sparsely settled by natives only. When the area was thrown open for settlement it was regarded as free from tsetse and nagana—a state of affairs which was somewhat confirmed by the apparent, if not real, absence of nagana amongst the herds of the earlier settlers: this was, however, more apparent than real, because there is now little doubt that sporadic outbreaks did occur, if not at once, at least three years after occupation. With the settlement of the Ntabanana section in 1919, a very serious state of things rapidly developed and since 1920, most of the cattle introduced have succumbed to nagana, and the whole area from Mhlatuze northwards became nagana infected. Notwithstanding the common occurrence of *Glossina pallidipes* in the game reserve and in Shooting Area No. 11 between the Mfolosi and Emseleni rivers the fact that tsetse were not observed further to the south led to the suspicion that the disease was being conveyed by some other blood-sucking insect, possibly a Tabanid or Stomoxys.

In 1922 Sir Arnold Theiler instructed the author to proceed to the Ntabanana settlement in order to clear up the point and ascertain what, in the absence of tsetse, was the agent transmitting the disease. Briefly it may be stated that *G. pallidipes* was found at each point where systematic collecting was undertaken from one end of the settlement to the other. The coastal zone on the east and the high grasslands on the west and south were unsuited to tsetse, but not to Tabanids and Stomoxys; the trypanosomiasis area therefore coincides with the distribution of *G. pallidipes*.

The characteristics of the area surveyed and the method employed in catching flies are described. Referring to the game factors, the author states:—

"There can be no doubt that game has been almost entirely responsible for the distribution of the tsetse fly in the nagana-infected area, and before settlement formed the main, if not the only, food supply for the fly. Since then, however, the country has gradually become more and more populated each year, with the result that the game has in consequence been gradually shot or driven back to the Crown lands and reserve to the north, and as the game has gradually diminished in numbers, so did domestic animals gradually increase and take their place, not only as food for the fly, but also as distributing agents for the pest, enabling it to migrate from unsuitable to suitable localities between the seasons, and acting as reservoirs for the trypanosome.

"In 1920, when game drives in the Ntabanana were instituted there was a hue and cry throughout South Africa that attempts were being made

to stamp out the game in that part of the country. Nobody, it is true, desires to kill off all the game in a country, but it must not be forgotten that man and game cannot live together in a fly area. Either one or the other must go, unless man is content to go in entirely for either agriculture or horticulture and to do all his work and transport with mechanical appliances."

Although the distribution of *G. pallidipes* coincides with that of trypanosomiasis there is, the author thinks, much to be said in favour of the view that tsetse alone are not responsible for the general outbreak of disease in the area under discussion. Cases of nagana are out of all proportion to the number of tsetse and it is probable that only a small proportion of tsetse are (*a*) suitable hosts for the trypanosomes, and (*b*) acquire infection through feeding on infected animals.

The fact remains, however, that where, e.g., on Farm No. 316, tsetse appeared the more abundant, nagana was the worst and, as a rule, the nearer the game reserve is approached, the more abundant are the tsetse and the more prevalent the disease. Furthermore, Tabanids and Stomoxys are both widespread, whereas the distribution of both nagana and *G. pallidipes* is not only limited, but appears to coincide.

The rest of the paper is concerned with an enumeration of the various blood-sucking insects found in the district.

W. Y.

Blanchard (M.), Broudin (L.) & Borel (E.). Surra du chien. Traitement par Bayer 205. Guerison(?). Expériences négatives de transmission de l'affection par *Rhipicephalus sanguineus* Latr. [**Surra in the Dog treated by Bayer 205. Negative Results of Transmission by** *R. sanguineus*. —*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 222–225. [4 refs.]

In October, 1926, a dog was brought to the authors from the plateau of Cam-Tiem (Indo-China); it was found to be infected with *T. annamense* and was heavily infested with *Rhipicephalus sanguineus*. Immediately after the presence of trypanosomes was discovered ·5 cgm. of "Bayer 205" was injected subcutaneously. This was followed by a "veritable resurrection" of the animal, but on the fifth day paresis of the hind limbs set in with incoordination of movements; examination of the blood two days later was negative. The nervous troubles subsided and towards the end of December the animal appeared to be in perfect condition. In a footnote it is remarked that on January 13th the animal suddenly became acutely ill with nervous symptoms and was shot by the owner without any examination being made.

The second part of the paper deals with the question whether the infection could be transmitted by ticks. Experiments showed that the trypanosome was rapidly destroyed in the intestine of *Boophilus annulatus* and *Rhipicephalus sanguineus* and that these ticks could not be concerned in the transmission of surra.

W. Y.

Channon (Hilda A.) & Wright (Hedley D.). **Observations on Trypanosomiasis of Rabbits and its Natural Mode of Transmission.** — *Jl. Path. & Bact.* 1927. Apr. Vol. 30. No. 2. pp. 253-260. With 1 fig. [15 refs.]

In this paper the authors describe the morphology and mode of transmission by the flea (*Spilopsyllus cuniculi*) of the rabbit trypano-

some, *T. nabiasi* Railliet, 1895. They give the following summary of their work :—

"1. A hutch rabbit was found infected with *Trypanosoma nabiasi*.

"2. Intravenous inoculations of infected blood into normal rabbits are not always followed by an infection. Infestation of rabbits with infected fleas was found to be a reliable method of transmitting the disease.

"Trypanosomes develop in the posterior station of the flea. The bite of fleas containing the developing trypanosomes is not infective but, if their alimentary canals are eaten by rabbits, infection of the blood stream follows.

"4. An attack of trypanosomiasis confers an active immunity which lasts at least 6 months.

"5. It was not found possible to infect rats, mice or guinea-pigs."

W. Y.

Niño (Flavio L.). Contribución al estudio de la distribución geográfica del *Triatoma infestans* y de su indice de infección por el *Schizotrypanum Cruzi*. [**The Geographical Distribution of *Triatoma infestans* and the Index of its Infection with *Schizotrypanum cruzi*.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Apr.Vol. 2. No. 11. pp. 91–95. With 1 map. [2 refs.]

It is recalled that Rosenbusch has established that in certain northern districts the Triatoma are not infected. The author set out to make an index of infection, and like Kraus and Rosenbusch reached the conclusion that there is no relationship between the incidence of infected bugs and that of endemics of goitre and cretinism [see this *Bulletin*, Vol. 23, p. 912].

Starting work in 1919 under the direction of Mazza, he examined in all 410 vinchucas from various provinces in north Argentine. The results were as follows : Jujuy, 47 examined and 44·86 per cent. infected ; Salta, 134 examined, 61·15 infected ; Tucuman, 117 examined, 76·82 infected ; Santiago del Estero, 47 examined, 26·64 infected ; Córdoba, 11 examined, 100 infected ; San Luis, 12 examined, none infected ; Mendoza, 18 examined, none infected ; San Juan, 2 examined, none infected ; Buenos Aires, 2 examined, none infected.

It appears from this that the infection of *T. infestans* with *Schizotrypanum cruzi* generally speaking increases from north to south, except in the Santiago district, where it is relatively low. The author was told by an engineer on the Rio Negro railway that between San Antonio and Bariloche there were no vinchucas and consequently he was unable to verify the statements of Kraus and Rosenbusch.

The absence of infected bugs in Mendoza and San Luis—both goitrous regions—is against the hypothesis that goitre and cretinism are due to trypanosomiasis. The rarity of cases of human infection and the large percentage of bugs infected suggests that there is another vertebrate host in nature, but what this is the author does not know.

W. Y.

Niño (Flavio L.). A propósito de las formas endoglobulares del *Schizotrypanum Cruzi* en la sangre periférica de la lauchita blanca. [**Concerning Endoglobular Forms of *Schizotrypanum cruzi* in the Peripheral Blood of the White Mouse.**] —*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 120–122. With 11 coloured figs. on 1 plate. [1 ref.]

The author, after referring to the fact that most observers refuse to accept the statement of Chagas that endoglobular forms of the

parasite are seen in the blood of man and experimental animals infected with *Schizotrypanum cruzi*, states that he has seen such forms in fresh and stained preparations of the peripheral blood of a white mouse infected 12 days previously by subcutaneous injections of the intestinal contents, containing numerous flagellates, of a Triatoma.

The intraglobular forms are seen in the red corpuscles and are not flagellates; the invaded red corpuscle is usually enlarged. The flagellated endoglobular forms of Chagas, the author believes to be merely superimposed parasites. The article is illustrated by a coloured plate in which the various forms superimposed and, what the author regards as, true intraglobular forms are depicted.

W. Y.

Niño (Flavio L.). Notas sobre anatomia patológica de la esquizotripanosis experimental. [**The Pathological Anatomy of Experimental Schizotrypanosomiasis.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 123–129. With 7 figs. [3 refs.]

There is practically nothing of note in this short article. The author states that *Schizotrypanum cruzi* has a preference for muscular tissue and exhibits a true myotropism comparable to the dermato- and neuro-tropism of the spirochaete of syphilis. *Schizotrypanum cruzi* makes straight for the muscular tissues, especially the cardiac muscles, and there forms nests of parasites.

W. Y.

Villela (Enrico) & Torres (C. Magarinos). [In Portuguese & English.] Estudo histo-pathologico do systema nervoso central em paralysia experimental determinada pelo *Schizotrypanum cruzi*. **Histo-Pathology of the Central Nervous System in Experimental Paralysis caused by** *Schizotrypanum cruzi*.—*Mem. Inst. Oswaldo Cruz.* 1926. Vol. 19. No. 2. In Portuguese pp. 175–198. With 36 figs. on 14 plates (4 coloured) [15 refs.] In English pp. 199–221.

After summarizing the results of previous work on the subject, the authors record their observations on the histo-pathology of the central nervous system made on a series of 39 adult dogs inoculated with a strain of *T. cruzi* isolated from *Tatus novemcinctus* and exalted in virulence by successive animal inoculations. A process of encephalomyelitis resulted, the clinical manifestations of which were paralyses, convulsions, and other nervous disturbances. The infection showed, however, great irregularity in its clinical symptoms and histopathological lesions. As canine distemper also exhibits a paralytic form, great care was taken to exclude this disease.

Encephalo-myelitis in paralytic dogs inoculated with *T. cruzi* is made up of small foci, always found in the vicinity of capillaries and of precapillary vessels, and occurring indifferently in the white and grey matter of the cortex and spinal cord: in the cerebellum the foci are scanty. They consist of macrophages, some of which have evidently migrated from the vessels (endothelial cells) and others, more numerous, probably originated from the neuroglia. The disintegration of the nervous tissue, the formation of many fatty granular cells, their subsequent dispersal and finally cicatricial fibrosis are successive stages in the evolution of the foci. *T. cruzi* (leishmaniform stage) is often found in the cytoplasm of the cells of the foci. The blood vessels show an infiltration of the adventitia and lymphatic sheath by macrophages, lymphocytes and plasma cells. The infiltration is irregular in distribution. In the small arterioles and precapillary

vessels inside or near the focus, there is proliferation of the endothelial cells with partial or total obliteration of the lumen of the vessel. Whilst the plasma cells are a constant element of the inflammatory exudate, they never predominate as in sleeping sickness.

Lesions of the nerve cells exist, but are not conspicuous ; the Purkinje's cells are most commonly affected and the changes found are swelling of the cell, perinuclear chromatolysis and necrosis. Other cells constantly affected are the large pyramidal cells of the cortex ; the multipolar cells of the spinal cord are less often affected. The duramater is normal ; the leptomeninges exhibit in places inflammatory changes. The exudate is not abundant and is of a mononuclear nature, consisting of macrophages, lymphocytes and plasma cells. Frequently, the leptomeningitis is of a haemorrhagic type, especially in the cerebellar region : the vessels of the leptomeninges show extensive infiltration by macrophages and plasma cells. The parasite is found within the cells surrounding the vessels. These cells, acting as macrophages, disseminate the trypanosome throughout the nervous system. Evidence is forthcoming suggesting that, in part at least, the return of the trypanosome to the circulation from the foci in the brain is brought about by migration of the neuroglia cells to the outer surface of the blood vessels.

W. Y.

THIROUX (A.). Au sujet de la prophylaxie de la maladie du sommeil. [**Prevention of Sleeping Sickness.**]—*Bull. Soc. Path. Exot.* 1926. Oct. 13. Vol. 19. No. 8. pp. 701–702.

The author asked Dr. VARNEAU to test the value as a Glossina repellant of an essential brownish oil (oil of cajeput) which M. MURAT had extracted in Annam from *Melaleuca viridiflora*. In a letter to the author, VARNEAU wrote that he had anointed two natives with the oil and had set them with two control natives to cut brush wood in a haunt of Glossina. The controls were severely bitten, but the two who had been anointed escaped almost entirely.

W. Y.

YAKIMOFF (W. L.). Deuxième cas d'infection de l'homme par les trypanosomes des animaux. [**Second Case of Infection of Man by Animal Trypanosomes.**]—*Ann. Soc. Belge de Méd. Trop.* 1926. Dec. Vol. 6. No. 3. p. 261. [1 ref.]

One of the author's pupils injected subcutaneously into herself a suspension in saline of trypanosomes from the camel, *T. ninae-kohl-yakimov*. A few days later she had a little fever, headache and general malaise. Examination of the blood was negative as was also inoculation of her blood into a guineapig. The symptoms lasted two weeks and then disappeared and she has remained well since during a period of 1½ years.

BRAU. Lutte contre la maladie du sommeil en Afrique Occidentale Française. [**Sleeping Sickness Campaign in French West Africa.**]—*Ann. de Méd. et de Pharm. Colon.* 1926. July–Aug.–Sept. Vol. 24. No. 3. pp. 383–394. [11 refs.]

A general account of the history of sleeping sickness in the French West African Colonies requiring no special notice.

SCHERN (Kurt). Zur Pathogenese der Trypanosomiasen. [**On the Pathogenesis of Trypanosomiasis.**]—*Deut. Med. Woch.* 1927. Jan. 14. Vol. 53. No. 3. pp. 106–107. [3 refs.]

This article is practically a summary of previous papers published by the author and already summarized [this *Bulletin*, Vol. 23, p. 428]. It contains no new observations.

DI DOMIZIO (Giovanni). *Trypanosoma brucei* nella Somalia Italiana. Nota I. Morfologia. Nota II. Tendenza al monoformismo. Raffronti morfologici. Identificazione. [*Trypanosoma brucei* **in Italian Somaliland. I. Morphology. II. Tendency to Monomorphism. Morphological Comparison. Identification.**]—*Nuova Veterinaria.* 1926. Oct. 15 & Nov. 15. Vol. 4. Nos. 10 & 11. pp. 261-271; 289-297. With 11 figs. & 4 plates.

The author has made an exhaustive study of the morphology of the polymorphic trypanosome propagated by *G. pallidipes* in Somaliland. He has studied 9 strains of the parasite obtained from 4 mules, 2 horses, a calf, and 2 dogs, and has reached the conclusion that the parasite is *T. brucei*.

W. Y.

REVIEWS AND NOTICES.

Souza (G. H. de Paula). Exposição de motivos sobre o problema da prophylaxia da lepra no estado de São Paulo. Annexo do officio N. 682, de 26 de Dezembro de 1925, da Directoria Geral do Serviço Sanitario, dirigido a S. Excia o Senhor Doutor José Manoel Lobo, Secretario de Estado dos Negocios do Interior de São Paulo. [**Prophylaxis of Leprosy in the State of S. Paulo.**]—115 pp. With 24 plates (2 maps). 1926. "Copag" S. Paulo.

The writer states that according to the most recent census there are about 5,000 undoubted cases of leprosy in the State of São Paulo in a population of 5,000,000. Careful investigations, however, have shown that in addition to these there are a number of more or less latent cases among the patients' family and relations, so that without exaggeration it may be reckoned that there are at least 10,000 lepers in the State.

Little definite is known about the incidence of leprosy in the other states in the Union of Brazil, but all specialists are agreed that the disease is prevalent on a large scale in neighbouring states, especially Minas Geraes. In the north of the country, especially in Para, in which the incidence is highest, and in Maranhao, there is a large number of cases and no state appears to be quite immune.

The author sets forth the following outline of prophylaxis which received the approval of the well-known leprologist D. Marchoux:

(1) Notification of cases of leprosy should be made compulsory.

(2) The census of lepers should be drawn up with greater accuracy than hitherto, all the patients being included, so as to give an exact and precise idea of the extent of the disease in the State.

(3) As far as possible domiciliary isolation should be permitted.

(4) Regional leper asylums should be established in the zones of the greatest incidence at the expense of the municipalities.

(5) The children and dependents of lepers should be isolated and protected from contagion.

(6) Present initiative in establishing homes for lepers or their dependents should be allowed and even encouraged.

(7) Courses of instruction in leprosy should be arranged for all persons who desire to attend them and especially for medical men holding an official position, in order to facilitate the diagnosis and treatment of incipient cases in view of the prophylactic and therapeutic benefits to be derived from the early recognition of the disease.

(8) The sanitary education of the patients, members of their family and the population in general should be promoted.

(9) Regional research stations should be established corresponding to the situation of the leper homes in order to compel all the lepers to attend them, especially those in an early stage of the disease.

Although the cost of an anti-leper campaign is considerable, neglect to ensure a proper prophylaxis greatly adds to the difficulty of the problem, owing to the slow but inevitable increase in the number of lepers, who are rendered incurable through proper measures not having been taken.

The author maintains that it would be much more economical to make a large outlay now than to spend an equivalent sum spread over a number of years. The present expenditure in any case is quite inadequate to deal with the problem.

The description of the accommodation for lepers in São Paulo shows that much remains to be done as the existing asylums are inadequate and mediaeval.

An appendix contains a large number of miscellaneous articles, including maps, showing the prevalence of leprosy in the State and town of São Paulo, a paper on the contagiousness of leprosy by Professor Breda, Dr. Marchoux's criticism of the Leper Hospital of S. Angelo, and the author's plans for a leper colony.

J. D. Rolleston.